THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The iron trade situation continues to hinge on the strikes of coal miners in various sections. The Alabama operators and the leaders of the union miners reached a tentative agreement at the end of last week, and at this writing it is being voted on by the miners. It provides for an advance to laborers, with substantially the same scale for miners as last year's. The expectation is that it will be ratified and work resumed, but meantime additional furnaces have gone out, six being idle at the beginning of the week, with the probability that others would need to bank awaiting the accumulation of sufficient coke, even in case of an early resumption at the mines. The situation in the Pocahontas field has improved somewhat, with prospects of a general resumption by the middle of the month. Conditions in the Eastern Pennsylvania field are no better, and the increased pressure for Connellsville coke, added to the shortage of cars in that region since the anthracite strike has required the hauling of so much soft coal to the East, has made coke scarce for Mahoning and Shenango Valley furnaces. Struthers Furnace banked this week and other stacks are on the verge of a temporary stoppage. The question of foundry iron prices for 1903 is having serious consideration, with views of sellers somewhat apart. There has been some informal conference among furnace firms. The ideas of Northern producers vary as much as $2.50, or from $20 to $22.50, with $21 at furnace commonly asked for No. 2. Southern sellers in most instances favor $17 at furnace. Buying is for both 1902 and 1903, with indications that more iron will be wanted for this year's delivery than furnaces can supply. In the Chicago district 25,000 to 30,000 tons were bought in the week for delivery in the first and second quarters of 1903, some of it at $17.50 Birmingham for No. 2. In the Pittsburg district a sale of 10,000 tons of Bessemer iron is reported at $21.75 Valley furnace for the last quarter of 1902, this being the highest figure for that delivery. Further importations of German spiegeleisen are to be made, a leading steel producer having placed orders for 16,000 tons in the past week. A sale of Virginia basic was made at $20.50 Pittsburg. Steel for the latter part of the year is somewhat easier. In the Central West 6,000 tons of foreign sheet bars were bought at $32.50 delivered, while the buyer, who has an open-hearth plant, is turning its product into billets which bring $34.50 at Pittsburg. A sale of 2,000 tons of foreign billets is reported at $33 Chicago. In the Pittsburg District negotiations for fourth quarter billets are reported on an offer of $31, but no sale at so low a figure is reported. The rail tonnage of the Pennsylvania Railroad—207,000 tons placed for next year—is the feature of the week in rolled material. This makes 1,000,000 tons, it is estimated, of new business for 1903, as against an estimate two weeks ago of 1,000,000 tons all told, including tonnage carried over from 1902. The plate mills that maintain 1.60c Pittsburg for tank are sold up to April, 1903; other mills readily get from 1.85c to 2c for available 1902 tonnage and some get 1.85c, or $5 premium, for plates for 1903. The shipyard demand is heavy, two 3,000-ton orders from independent lake yards being taken in the past week. In the Chicago District one maker of structural shapes sold 12,000 tons in the past week and the rail mill in that district is booked to July 1, 1903. The structural demand is most persistent and higher prices are paid for 1902 material. Bar iron is higher in the Central West, one producer asking a considerable advance over 1.80c Pittsburg. There is rather more competition on sheets and independent mills are shading prices recently quoted.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, July 9.

The largest transaction in the iron and steel trade for some time was the placing of the order of the Pennsylvania Railroad Co. for rails for delivery next year. The order calls for the delivery of 207,000 tons, which is 32,000 tons greater than this company's contract for 1902. The business was divided as follows: United States Steel Corporation mills, 110,000 tons; Cambria Steel Co., 38,500 tons; Pennsylvania Steel Co., 38,500 tons and Lackawanna Iron & Steel Co., 20,000 tons. The entire tonnage placed with the United States Steel Corporation is to be rolled at the Edgar Thomson plant of the United States Steel Co., where the Kennedy-Morrison process of finishing rails is in operation. A number of additional orders for rails were also placed by smaller roads bringing the total of new business for delivery in 1903 close to 1,000,000 tons, beside several hundred thousand tons to be carried over from 1902. Thus far nearly every road that has placed its order for rails has increased its tonnage over this year's requirements thus insuring a larger tonnage for next year's delivery than this year, which promises to be the largest in the history of the trade.

Considerable interest is also centered on the plate situation. The American Shipbuilding Co. recently made inquiry for the delivery of nearly 20,000 tons of plates in installments of nearly 3,000 tons a month during the next six or seven months. With the plate mills crowded as they are at present considerable difficulty is being experienced in taking care of the order and the probabilities are that it will be divided among the mills of the country. In addition sufficient structural material for the boats for which the plates are intended is being inquired for, and there is serious question of the ability of the mills to make proper deliveries. The pipe mills of the country are also unable to get their regular tonnage of plates for the manufacture of the larger sizes of pipe and shipments on the latter are being seriously interfered with. The plate mills in the East are quoting 2c at mill while local mills are having no difficulty in taking business at 1.85c.

There has been some buying of foreign sheet bars during the week, one concern having purchased 6,000 tons at $32.50 delivered. This same concern is selling open-hearth billets at $34.50, Pittsburg, and is rolling the foreign sheet bars into sheets. Other sheet mills with open-hearth plants are also offering their product for sale in the form of billets, and high grade material containing carbon .75 has been sold in small lots during the week at $38 at mill. Billets containing carbon .50 are being offered at $36.50 and are being sold in small lots to manufacturers of crucible steel.

A meeting of the shafting manufacturers is being held at Lake George, New York, today but it is not probable that there will be any advance in prices. The sheet market continues fairly firm, although some of the independent mills, anxious to get busuiness, are offering their products at prices slightly below the quotations of the American Sheet Steel Co.

PIG IRON.—Coke deliveries in the Mahoning and Shenango Valleys were very bad during the latter part of last week,

although the shipments this week are somewhat better than they have been for some time. With the furnace capacity of the country increasing, the coke question is going to prove a difficult one to solve. It is already apparent that the coke output is not nearly large enough to provide properly for the furnaces now in operation and the ovens under construction are not sufficient to take care of the furnaces that will be in blast within a year. There has been considerable buying of foundry iron for delivery the first quarter and the first half of next year, upwards of 10,000 tons being sold in the week at prices ranging from $21.75 to $22.25 for No. 2. The furnaces also have a large number of inquiries on their hands and the interest in next year's deliveries is increasing. For prompt shipment in small lots, No. 2 foundry commands from $23 to $23.50 per ton. We also note the sale of 10,000 tons of Bessemer iron for delivery the last quarter of this year at $21.75 at the furnace or $22.50 delivered, which is the highest price yet recorded for such a large quantity for this delivery. Northern basic is practically not to be had while 1,000 tons of Virginia basic for delivery during December has been sold at $20.50, Pittsburg. Pig iron deliveries continue several months behind and as conditions seem to have combined to prevent the furnaces from turning out their normal output, it is apparent that the shortage will grow during the next six months. We revise our quotations as follows:

Bessemer, Valley	$21 75 to 22 00
Bessemer, Pittsburg	22 50 to 22 75
No. 1 Foundry	23 50 to 24 00
No. 2 Foundry	21 75 to 23 50
No. 3 Foundry	21 25 to 21 75
Gray Forge, Pittsburg	20 75 to 21 00
Chilled Basic, Valley	20 25 to 21 00
Chilled Basic, Pittsburg	21 50 to 21 75

STEEL.—The falling off in the demand for sheet bars has resulted in a slight weakening of the prices, and while the open-hearth product is quoted at $33.50 per ton the mills are having little difficulty in securing $34.50 for billets, ordinary specifications. One of the large sheet mills in the Wheeling district has placed an order for 6,000 tons of foreign sheet bars at $32.50, delivered, and is selling its open-hearth billets at $34.50 per ton, thereby making a profit, which would be a loss if the billets were converted into bars at present prices. Bessemer billets are somewhat weaker and sales have been reported at $33 per ton. One deal is said to be under way for a large tonnage of Bessemer billets in which the price named is $31 for delivery the next six months, but it has not yet been closed and we cannot vouch for the price quoted. Bessemer rods do not seem to weaken in price and mills continue to quote from $36 to $37 per ton according to delivery.

FERRO-MANGANESE.—There is little doing in either foreign or domestic manganese as nearly all the mills have contracted for their supply for the next six months. We quote English ferro, 80 percent at $52.50, delivered anywhere in this country and Germany at $52.25. No domestic is being offered.

RAILS AND TRACK MATERIAL.—The rail tonnage for next year's delivery was greatly increased during the week the Pennsylvania Railroad Co. and several smaller roads having place dtheir orders. The contract of the Pennsylvania Railroad calls for 207,000 tons—the largest contract ever placed by this road—while smaller contracts calling for about 50,000 tons were also placed bringing the total new rail tonnage for next year's delivery already contracted for close p to 1,000,000 tons. The situation in light rails is very strong and certain sections are etnirely out of the market. As a result of this scarcity of new light sections, relaying rails are bringing enormous prices. We revise quotations as follows: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $46; 12 pounds, $44; 16 pounds, $42; 20 pounds, $40; 25 to 40 pounds, $38 to $40. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

MUCK BAR.—There is little doing in muck bar made in mills in this district although considerable is being offered at $36 to $36.50 per ton. Eastern mills are offering muck iron delivered here at about $35 per ton.

SKELP.—Considerable iron skelp is also being offered here at prices considerably lower than quoted by local mills. We quote both grooved and sheared iron skelp at 2.20c and steel at 2.25c.

SPELTER.—There has been a big advance in spelter during the week, prime Western grades now being quoted at 5c to 5.05c, Pittsburg.

PLATES.—The plate situation continues to grow stronger daily. The order of the American Shipbuilding Co. which calls for nearly 20,000 tons will fill up the mills for the next six or seven months and it is doubtful whether deliveries can be made on any further large contracts before January or February of next year. Eastern mills are quoting 2c on plates for delivery this year while local mills are securing 1.85c on all running business. Agreed quotations are as follows: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plate more than 100 inches wide, 5c extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

BARS.—Considerable new business is being offered in steel bars but it is generally confined to small lots. Iron bars are reported somewhat stronger than they have been for some time. Our quotations are as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.80c to 1.90c, Fittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots; refined iron bars, 2.25c and upwards.

PIPES AND TUBES.—The situation is exceedingly strong and the independent mills are securing an immense tonnage that the National Tube Co. cannot fill on the smaller sizes. Deliveries on the larger sizes are considerably behind. Quotations to jobbers in carload lots, with freight added to destination, are as follows:

MERCHANT PIPE.

	Black. Per cent.	Galv. Per cent.
⅛ to ⅜ and 11 to 12 inches	60	48
¼ to 12 inches	67	55

Discounts to consumers in carload lots, Pittsburg, are as follows:

BOILER TUBES.

Steel.

	Per cent.
1 to 1⅜ inches	42½
2¼ to 5 inches	61
1¼ to 2¼ and 6 to 13 inches	55½

Iron.

	Per cent.
1 to 1¾ inches	39
2¼ to 5 inches	48
1¾ to 2¼ and 6 to 13 inches	38

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	63

SHEETS.—Some of the independent mills have been making slight concessions on future business ranging from $1 to $2 per ton below the quotations of the American Sheet Steel Co. There is also a slight weakness in galvanized. We make the following quotations, carload lots: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets, in carload lots to consumers, are quoted at 3.05c for Nos. 10 and 11, 3.45c for Nos. 18 to 21, 4.20c for No. 27, and 4.50c for No. 28. Galvanized sheets, mill shipments in carload lots to consumers are as follows: Nos. 10 and 11, 3.05c; Nos. 12 to 14, 3.15c; Nos. 15 to 17, 3.25c; Nos. 18 to 21, 3.45c; Nos. 22 to 24, 3.75c; Nos. 25 and 26, 4c; No. 27, 4.25c; No. 28, 4.50c.

STRUCTURAL MATERIAL.—One of the large local structural mills is not quoting below 1.85c on structural shapes for delivery the remainder of the year, and on small lots 2c is quoted. The American Bridge Co. secured the contract for the erection of the power plant for the Pittsburg Railways Co. calling for 1,200 tons of steel. Agreed quotations are as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—With a number of the independent mills shut down the situation is somewhat stronger in wire and wire nails and agreement quotations are being readily maintained. The demand for cut nails is also reported good. We make the following quotations: Wire nails in carload lots, $2.05 per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire, $2.40 in carload lots; polished staples, $2.20, and galvanized staples, $2.60; painted barb wire, $2.60, and galvanized, $2.90. These prices are quoted on a Pittsburg base, plus the actual freight to destination. Cut nails are held at $2.05 in carload lots and $2.10 in less than carload lots, Pittsburg, plus freight to destination.

MERCHANT STEEL.—A meeting of the shafting manufacturers is being held today at Lake George, New York, but no change in prices is anticipated. We revise quotations as follows: Turned, cold rolled ground shafting in carload lots is quoted 50 off, and in less than carload lots, 45 off; tire steel, 2.25c to 2.30c; toe calk, 2.35c to 2.45c; sleigh shoes, 2.25c to 2.35c; machinery steel, 1.70c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—With all of the finishing mills of the Republic Iron & Steel Co. shut down there has been considerable falling off in the demand for old material and the market has eased off to a considerable extent. No. 1 cast scrap is quoted at $17.50 gross ton while sheet scrap is held at $18.75 to $19. Heavy melting stock is also somewhat easier and is quoted at $20.75 to $21 and No. 1 wrought scrap is quoted at $22. Light rails for relaying purposes are commanding fancy prices, one lot of 40 pound rails having been sold at $38 per ton. We also note the sale of 500 tons of 24-pound rails at $12 per ton.

COKE.—Despite the tremendous output of the Connellsville region it is not nearly large enough to satisfy the demand. The furnaces in both Valleys are suffering on account of the scarcity of coke and there is grave danger that some will be banked. Considerable coke is being shipped from the region to Eastern furnaces while a large tonnage is going to furnaces in Southern Ohio. For Eastern shipment as high as $3.50 and $4 is being paid for furnace coke while on contracts from $2.25 to $2.50 is quoted for strictly Connellsville furnace coke. Foundry coke is held at $2.75 to $3. Outside coke is held at about 25 cents per ton below these prices. For the week ending Saturday, June 28, the output of the upper and lower Connellsville region according to the Connellsville *Courier* amounted to about 285,000 tons. The shipments for the week from the two regions were 600 cars greater than those of the previous week.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
519 MONADNOCK BLOCK, July 8.

The two holidays last week were factors in the market only to the extent of the lost time. Both immediately before and after there was activity in many branches of the trade. In pig iron there is forming the basis for a considerable buying movement, if the producers can be induced to start the negotiations with quotations that look right to the buyers. There is one feature of the market, however, that is not entirely reassuring to prospective purchasers. It is that iron is offered for the first quarter of next year by some makers at from $1 to $2 below the price asked for the fourth quarter of 1902. The melters figure from this that the market tends to decline or that the producers think it will weaken. But as a matter of fact the furnacemen in question are only continuing throughout the year the premiums for spot iron that have existed for months, and on forward deliveries are dropping the premiums. The present tendency is for the price of pig iron to advance for immediate consumption owing to the banking of Southern furnaces.

Billets also are becoming scarcer, with an excellent demand. Negotiations are still pending for a large tonnage of structural material for next year's delivery, with prospects for early sale. The business actually closed in shapes during the past week has been excellent, 12,000 tons having been placed by one maker. Rails are moving steadily in moderately sized lots. The Western rail mills are now sold up to July, 1903, and new inquiries keep appearing. The announcement of the Pennsylvania Railroad order was the feature of the week. Finished material is exhibiting few if any of the symptoms of midsummer inactivity. The present buying is mainly for lots of a few hundred tons at best and for variable deliveries. Where there is no advance in values there is firmness. With muck bars selling at Pittsburg at $35 iron bars can not well sell at Chicago for 1.75c, the recently quoted price by one or two Western mills. Scrap does not yield in value and the change in old material is rather the other way, some slight advances being noted.

PIG IRON.—There was interest in the pig iron market last week; this week there is anxiety. The reports of idle Southern furnaces following the coal miners' strike is creating solicitude among those melters who have large amounts of iron coming to them from the South. There is no perceptible diminution in the receipts as yet, for often ten days are consumed by the iron in transit, but some melters who have been making inquiries as to the certainty of their early deliveries have not been encouraged by the replies received. It is thought that the demand for spot iron will materially increase within the next few days, unless the labor situation in the South shows improvement, and that prices for this spot iron is almost certain to advance. For immediate delivery Southern foundry No. 2 is now selling at $18.50 to $19, Birmingham, or $22.15 to $22.65, Chicago. For the first quarter of 1903 it is offered in some instances for about $21.15, Chicago. Buying for the first quarter of 1903 has been quite brisk. Perhaps 25,000 or 30,000 tons have been sold in this market in lots of from 5,000 tons down to a few hundred. The large agricultural implement inquiry, to which reference was made last week is not known to have been closed but another large implement maker has in the meantime appeared and taken from various furnacemen a fairly good tonnage for delivery during the months of January, February and March. There is perhaps less hesitation among buyers than a week or two ago, for the more recent developments in the trade point to a tighter rather than an easier market. Local irons share in the present business but one of the large Southern producers is understood to be declining to quote. Prices follow:

Lake Sup. Charcoal	$23 50 to $24 00	Southern Coke No. 4	$20 15 to $20 65
Local Coke Fdy. No. 1	22 00 to 23 50	Southern No. 1 Soft	21 65 to 22 15
Local Coke Fdy. No 2	21 00 to 22 50	Southern No. 2 Soft	20 65 to 21 15
Local Coke Fdy. No. 3	20 00 to 21 50	Southern Gray Forge	20 15 to 20 65
Local ScotchFdy.No.1	22 00 to 22 50	Southern Silveries	22 15 to 23 15
Local ScotchFdy.No.2	20 50 to 22 00	Jackson Co. Silveries	24 50 to 25 50
Southern Coke No. 1	21 65 to 22 15	Ohio StrongSofteners	24 10 to 24 60
Southern Coke No. 2	21 15 to 21 65	Alabama Car Wheel	24 65 to 25 10
Southern Coke No. 3	21 65 to 22 15	Malleable Bessemer	22 50 to 23 50

BARS.—With no especially notable transaction in bars, the tonnage which the week's business aggregates is very satisfactory. There is a decidedly firmer feeling in the market and the low quotation of 1.75c for iron bars, heard of several weeks ago is no longer mentioned. Some of the iron mills resumed this week and others will start up next Monday. The Springfield, Ill., mill of the Republic Iron & Steel Co., is almost ready for operations. We quote Chicago delivery, Bessemer steel, 1.75c to 1.85c; angles, less than 3x3, 1.85c; iron, 1.80c to 1.85c; hoops, 2.15c. Prices out of store: steel, 2c to 2.10c; iron, 2.15c to 2.25c; hoops, 2.40c to 2.45c; angles, 2.50c to 2.60c.

SHEETS.—There are no new developments in sheets. Galvanized product is in evidence at many places but black sheets are not so readily procured, especially the heavier gauges. We quote No. 27 black, mill shipments, Chicago delivery, 3.15c to 3.25c; galvanized, 4.40c to 4.50c; out of store, No. 27 black, 3.45c to 3.55c; galvanized, 4.70c to 4.80c.

STRUCTURAL MATERIAL.—Tonnage booked for next year's deliveries during the short holiday week ran up to about 12,000 tons. There are other inquiries aggregating several times that amount. Hence the outlook for business is excellent. There is no diminution in the demand for shapes from warehouse and the relatively high quotations from store are easily maintained. We quote mill prices as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; structural angles, 3x3 to 6x6, 1.85c; angles, channels and tees, smaller than 3 inches, 1.85c base; plates, 1.75c. Prices on lots from store are based on the necessities of buyers and according to the size of order. Store prices vary from 2½ to 4 cents a pound.

BILLETS.—There was one sale of 2,000 tons of foreign billets at about $33, Chicago. Other trades are under consideration. The prospects for a suspension of shipments of Southern billets to this market in consequence of the labor troubles in Alabama is occasioning considerable anxiety among users. There is a ready market here for quite a good tonnage of steel.

Open-hearth billets are scarce and are quoted steady at about $37 to $38.

RAILS AND TRACK SUPPLIES.—Each week adds to the already large tonnage of steel rails booked for next year's deliveries. The local mills are now said to be sold up until some time in July. This is giving to the outside mills an increased inquiry and the market is thus broadening. Light rails also meet with favor from buyers and track supplies can be readily placed if a mill can be found to place them, most mills being well sold up for the current year. We quote standard rails, $28; second quality, $27; light rails, 45 pounds, $34 to $35; 12 pounds, $40 to $41, with regular differentials for intermediate sizes; out of store, $45 to $50; splice bars, 2.25c; spikes, carload lots, 2.45c to $2.55c; track bolts 3½x3¼, with square nuts, 2.85c per 100 pounds; with hexagon nuts, $3, with usual differentials for other sizes.

MERCHANT STEEL.—The June business of one large seller of merchant steel exceeded both in tonnage and in value that of any preceding June in the history of the seller. While the current demand for merchant steel is not especially active it is too large for the makers to fill and some desirable tonnage has lately been turned down. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open-hearth spring steel, 2.65c to 2.75c; sleigh shoe, 1.75c to 1.80c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality: toe calk, 2.25c to 2.35c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 percent to 10 percent higher, cold rolled shafting, carload lots, 50 percent off, Chicago; less than carload lots, 45 percent off, Chicago.

CAST IRON PIPES.—New demand for cast iron pipe this week has been comparatively light. Prices are firm on the basis of $34 carloads for 4-inch water pipe.

MERCHANT PIPE.—Seven inch pipe and larger sizes are very hard to find for early shipments. The smaller sizes respond fairly well to inquiries, but trade is not quiet. Boiler tubes have a good strong undertone, with correspondingly good demand. Prices are as follows:

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ in.	58	45
¼ to 12 in.	65	52

BOILER TUBES.

Steel.

	Per cent.
to 1⅜ in.	35
1¾ to 2½ in.	45
2¾ to 5 in.	55
6 to 13 in.	47½

Iron.

	Per cent.
¼ to 1⅜ in.	35
1¾ to 2½ in.	32½
2¾ to 5 in.	42½

PLATES.—The inability of mills to make shipments on new contracts until far into the future is sending many inquiries to the warehouse trade, which in consequence is very lively. There have been some advances out of store within the past week, mill quotations remaining unchanged. We quote mill prices, Chicago delivery: Tank steel, ¼-inch and heavier, 1.75c to 2.15c; flange steel, ¼-inch and heavier, 1.85c to 2.25c; from stock, tank steel, ¼-inch and heavier, 2.30c to 2.50c; 3-16, 2.40c to 2.60c; No. 8, 2.45c to 2.65c; flange steel, 2.50c to 2.60c.

WIRE AND WIRE NAILS.—Demand for wire and wire products is lighter this week because of the after-holidav effects. Some of the mills are closed down for repairs. Prices are steady. We quote as follows: Smooth wire carloads, $2.15; painted barb wire, $2.75; galvanized barb wire in carload lots, $3.05; wire nails, carload lots, $2.20; staples, carload lots, $2.30; jobbers' prices to retailers, 5 cents higher than above for carload lots, and 10 cents higher for less than carload lots.

COKE.—An active demand for coke continues at the late advance. Receipts from ovens are not what they should be and it takes some shopping around occasionally to find the desired fuel. We quote 72-hour Connellsville foundry $5.75; for spot delivery, $6.00; Virginia and West Virginia coke, $5.25 to $5.50.

OLD MATERIAL.—There was one purchase this week of about 4,000 tons at previous quotations. There have been various transactions for lesser tonnages but the opinion prevails that the market is rather inactive. Some grades are quoted on a somewhat higher range and the market may be considered as very firm. We quote gross tons as follows:

Old iron rails	$24 00	to $25 00	Relaying rails	31 00	to 31 00
Old steel rails, long lengths	23 00	to 24 00	Old wheels	20 00	to 21 00
Old steel rails, short lengths	18 00	to 19 00	Heavy melting steel	19 00	to 20 00
			Mixed country steel	14 50	to 15 00

The following are selling prices per net ton:

No. 1 R. R. wrought	$20 50	to $21 50	Steel axles	$20 00	to $21 00
No. 2 R. R. wrought	19 00	to 20 00	Cast borings	10 00	to 10 50
Dealers' forge	15 50	to 16 00	Wrought turnings	13 50	to 14 00
No. 1 busheling	13 50	to 14 00	Iron axle turnings	14 00	to 14 10
No. 1 R.R. & mch. cast	14 25	to 14 75	Steel axle turnings	13 50	to 14 00
Railway malleable	15 50	to 16 50	Stove plates	11 00	to 11 50
Country malleable	13 50	to 14 50	Old iron splice bars	21 00	to 21 50
Iron axles	24 50	to 25 00			

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, July 9.

A comparative statement of ore shipments from upper lake ports for the month of June and to July 1, 1901 and 1902, shows a very large increase this year. The most conservative estimate for the year is now 23,000,000 tons, while there are those who for reasons of their own place the estimate at 25,000,000 tons. Such figuring either counts on an increase in furnace capacity that is not now apparent or on the bringing down of more unsold ore than in several years. The shipments for June, 1901, were 3,373,833 gross tons, and for June, 1902, 3,751,595 tons, an increase of 377,863. The shipments to July 1, 1901, were 4,063,608 tons, and to July 1, 1902, they were 8,899,833 tons, an increase of 3,936,225 tons. A very large percentage of the ore is going direct from dock to furnace. The ore on the docks is about the same as last year's stocks at this time.

PIG IRON.—It has been almost impossible to get even small quantities of iron for this year and the situation was further embarrassed this week by the great difficulty in getting in a supply of coke. It is said that the trouble is due more to lack of cars than to scarcity of coke, as many cars which would ordinarily be available in this section are being used in hauling soft coal to the East. The Struthers Furnace Co. was compelled to bank its furnace Tuesday because coke could not be obtained, and nearly all the furnaces about Youngstown are living from hand to mouth in constant fear of being compelled to bank. Inquiries for iron for 1903 still continue, but buying far ahead is not encouraged by conservative agents and few contracts are being made. The strike of Birmingham miners has aroused much interest in Cleveland on account of the probable cutting off of supplies of Southern iron. For No. 2 foundry $18 and $18.50 at Southern furnace is paid for 1902 iron; Northern furnaces are selling for this year's delivery at from $21.50 to $22.50 for No. 2 at furnace. Next year's iron is $1 to $1.50 less. Bessemer iron is very quiet and is likely to remain so for some time. We quote the Cleveland market as follows:

Bessemer	$21 75	to $22 25	Scotch No. 1	$21 75	to $22 75
No. 1 Strong F'dry	21 75	to 22 75	Scotch No. 2	21 25	to 22 25
No. 2 Strong F'dry	21 75	to 22 25	Gray forge, Valley	20 00	to 20 50
No. 3 Foundry	20 75	to 21 75	LakeSuperior charc'l	23 00	to 24 00

FINISHED MATERIAL.—The feature of the week has been the very strong demand for plates. A leading Pittsburg interest is sold up to April. The market is active and premiums of from $3 to $5 a ton are being obtained for deliveries this year. The shipbuilding companies are still buying. Among the sales this week were 3,000 tons to the Craig Shipbuilding Co., Toledo, and 3,000 tons for steel cars to a Canton company. The range of prices is 1.70c to 1.85c, Cleveland, for tank according to deliveries. The bar mills of the Republic Iron & Steel Co. in the Mahoning Valley will resume Monday. The Empire Rolling Mill Co.'s plant in this city was reopened Wednesday. The situation in bars remains about as it was last week, large rounds being exceedingly hard to get. The agreed price for bar iron is 1.80c Pittsburg, but considerable advances are secured for early delivery. We quote steel bars, round and square, ¼ inch to 2¼ inches, delivery in 30 days, and large sizes 3 to 6 months, at 1.60c for Bessemer and 1.70c for open hearth, Pittsburg. Sales out of store, Cleveland, are on a basis of 1.90c to 2c. The demand for sheets is comparatively light and it is known that many mills would be glad to lay off for a day or two each week. We quote 2.10c to 2.15c Cleveland for 3-16-inch and heavier and 2.25c Cleveland

for No. 8. Cleveland prices continue on the following basis on mill sales of black sheets: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c; and the following prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 22-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c, for one pass cold rolled. For full rolled .10c extra is charged. On galvanized sheets Cleveland prices to consumers are as follows for carload cots: Nos. 10 and 11, 3.15c; Nos. 12 to 14, 3.25c; Nos. 18 to 21, 3.55c; Nos. 22 to 24, 3.85c; No. 27, 4.53c; No. 28, 4.60c. The general situation in structural material continues strong. One sale of 6,000 tons was made this week. Angles are still scarce. For beams and channels 2½c to 3c and even higher is paid for small lots.

OLD MATERIAL.—The shut down of the mills has caused the market to be very dull the past week, but prices have remained firm. We quote the Cleveland market, all gross tons, as follows:

Old iron rails	$ 26 00 to 27 00
Old steel rails (6 ft. and over)	22 00 to 23 00
Old steel rails (6 ft. and under)	19 00 to 20 00
Old car wheels	18 00 to 19 50
No. 1 R. R. wrought scrap	21 50 to 22 00
Mill scrap	20 00 to 20 50
No. 1 machine cast scrap	17 50 to 18 50
Iron axles	28 00 to 29 00
Axle turnings	18 00 to 18 50
Wrought turnings (free from cast)	14 00 to 14 50
Cast borings	9 50 to 10 50
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	16 00 to 17 00
Grate bars	11 50 to 12 50
Pipes and flues (clean)	17 00 to 18 00
Tank iron	17 00 to 18 00
Hoop and band iron	13 50 to 14 50
Sheet iron	11 50 to 12 00
Wrought drillings	13 00 to 13 50
Malleable iron	17 00 to 18 00
Stove plate	13 00 to 14 00
Heavy steel	18 50 to 19 50

CINCINNATI.

July 8.

Conditions are a little more promising than they were. The latest information is that the strike in the Birmingham District among the miners will not be kept out very long and even now it is expected that they will return to work in a day or so. There has been a good tonnage of iron moving, considering the conditions, and there have been a good many orders taken by such of the furnaces as have iron to offer for delivery during the latter part of the year. Orders have been placed for delivery during the remainder of the year at $18.50 at furnace in most cases; and iron for delivery beyond the end of the year, that is business for 1903 delivery, has all been subject to freight rate changes, and largely at $16.50 at furnace. This shows that an advance in the freight rate is considered probable at least.

In finished material and in all other kindred lines the business holds up wonderfully well. The situation in the iron market by reason of the strikes and the inability to get coke and coal has apparently influenced the other branches of the iron trade in but one way, that is to stimulate them. Some of the consumers have been hurrying up shipments of iron where they were rather passive a short time ago. Increased construction is confined not to the manufacturing concerns that use castings and finished material. There have been a good many movements towards establishing new foundries, and two are certain to be built in this city in a short time.

PIG IRON.—The market for pig iron remains about as it was last week, save that iron for immediate shipment commands a higher premium. There has been a good tonnage booked for 1903, foundry irons predominating in the bulk of that contracted for. As a rule $16.50 for No. 2, Birmingham has been the price at which these deals have been made. Iron for delivery at once or during the remainder of the year brings various prices, all the way from $17.50 to $20. Quotations on pig iron are therefore hard to give and any formal figures must be taken with consideration of the conditions.

It is expected that the situation will be materially relieved this week. Advices received here are that the men are going back to work in large numbers in the Pocahontas District. As intimated above the Southern strike will probably be called off soon, the operators having agreed to make an advance in the wages paid day laborers in that district, while the union scale remains practically the same. It is thought that this will be accepted by the men.

The following table gives quotations on iron at Cincinnati, the prices being those for iron for delivery during the latter part of the present year and the first of 1903, the larger amount of the business now coming in being for these months:

Southern Fdy. No. 1		$20 75 to 21 75	Gray Forge		$19 00 to 20 00
"	"	2 20 25 to 21 25	Northern Fdy. No. 1		24 10 to 24 60
"	"	3 19 75 to 20 75	"	" 2	23 60 to 24 10
"	"	4 19 25 to 20 25	Southern C. W. Iron		25 25 to 25 75
So. Fdy. No. 1 soft		20 75 to 21 75	Malleable coke iron		22 75 to 23 50
So. Fdy. No. 2 soft		19 75 to 20 75			

FINISHED MATERIAL.—The demand for finished material continues good and the deliveries continue bad. Orders are coming for all kinds of material, there having been large contracts made during the past week or so for sheets, plates, structural material and the like for delivery during 1903. Bar iron and steel bars have not been so liberally contracted for, as there has not been the difficulty in getting them. Building is being delayed by the inability to get material, and manufacturers are complaining about deliveries on all kinds of shapes. There are no changes in prices from the last report, bar iron remaining at 1.92c and bar steel at 1.72c, both iron and steel bars being quoted at 2.20c out of store. Angles are 2.35c and 2.50c out of store. Sheets are quoted at 2.50c for No. 12 and 2.35c for No. 10.

OLD MATERIAL.—It would seem natural for scrap to advance in price in view of the trouble in getting pig iron and the high prices at which spot iron is selling. A large handler explains the situation by saying that there is a scarcity of scrap as well, and so much so that there is scarcely enough on which to make a market. Prices are unchanged as follows:

Old No 1. Wrought Railroad, net tons	$ 20 50 to 21 00
Cast Machine and Foundry, net tons	14 50 to 15 00
Old Iron Rails, gross tons	25 00
Old Steel Rails, gross tons	24 00
Old Short Lengths, gross tons	17 50 to 18 00
Old Iron Axles, gross tons	26 75 to 27 00
Old Iron Car Wheels, gross tons	19 50 to 20 00
Stove Plates, gross tons	11 00 to 11 25
Wrought Turnings, net tons	14 50 to 15 00
Cast Borings, net tons	9 50 to 9 75

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., July 8.

PIG IRON.—Although the past week was broken by holidays the pig iron market was characterized by considerable activity. Most of this was displayed by buyers who have immediate needs to meet. As usual, expressions of disappointment were heard, one foundryman remarking that pig iron for near delivery seemed to be scarcer than the proverbial hen's teeth. Prices for such iron continue erratic, with the seller in a position to dictate them. A commission merchant cites one sale of 50 tons of No. 1 X Northern for delivery in New York in ten days at $28 per ton. As a general rule, however, spot delivery for the same grade is $25 a ton, with exceedingly small offerings the feature. There has been no diminution in the demand for foreign irons. Cable advices are that prices are advancing, with shipments not as satisfactory as several weeks ago, and with the supply showing a tendency toward restriction.

Buying for next year is on a conservative scale. Southern producers are still reluctant to do business in this line, although their inquiries are becoming more general. Sales of small lots for 1903 in No. 2 foundry were made on the basis of $17 at Birmingham. Sales agents and commission merchants in New York generally believe prices for 1903 will be lower, although admitting that they have nothing tangible upon which to base their opinion. As to the amount of iron that will be required to meet contracts for the present year the opinion is expressed that it will be larger than has been supposed. Foundrymen are melting considerably more iron now than at this time last year, and reports of the construction of additional cupolas are coming in from many quarters. New York prices for iron as given below are nominal for the most part: No. 1 X Northern, $23.50 to $25; No. 2 X, $22.75 to $23.50; No. 2 plain, $22.75 to $23.50; No. 1 Foundry, Southern, $22.00 to $23; No. 2 Foundry, $21.75 to $22.50; No. 3 Foundry, $21.25 to $21.75; No. 4 Foundry, $20.75 to $21.25.

FINISHED IRON AND STEEL.—Business during the week was of good proportions. Spot deliveries of structural material are out of proportion to pool prices, and some sales were made during the week at premiums of $15 per ton over the latter. All of the large producers are besieged with inquiries regarding prompt deliveries, but would-be buyers find little or no encouragement in the replies. Foreign material is sought with considerable eagerness, with prices and shipments satisfactory in the main. In sheared plates premiums for prompt delivery can easily be secured ranging from $5 to $10 per ton, according to time. The sheet trade has been marked by dullness, and with the majority of the mills it is inventory time. Prices for New York are as follows: Beams and channels, 15 inches and under, 1.75c to 1.95c; angles, 3 to 6 inches, 1.75c to 1.95c; zees, 1.75c to 1.95c; bulb angles, 2.05c to 2.25c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 2.10c to 2.15c; flange, 2.20c to 2.25c; fire box, 2.35c to 3.50c; refined bars, 1.95c to 2c; soft steel bars, 1.95c to 2.05c; sheets, No. 28, black, in car loads, New York, 3.18c to 3.25c; No. 28, galvanized, 70 and 10 off.

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The British Commission's Report on the American Iron Industry.

American Industrial Conditions and Competition. Report of the Commissioners appointed by the British Iron Trade Association to inquire into the Iron, Steel and Allied Industries of the United States. Edited by J. Stephen Jeans, Secretary of the British Iron Trade Association. London, 1902.

In an octavo volume of 590 pages the commissioners of the British Iron Trade Association who came to the United States in the fall of 1901 to investigate conditions in iron and steel manufacture, have made their report. It is an impressive volume, and the merely cursory examination which has preceded this mention shows that the commissioners made the most of their six weeks' stay in the United States. The errors due to the haste of the tour and to the great mass of material handled are insignificant, and the impression left by a first perusal of the work is that of the magnitude of the task and the ability, insight and energy of the investigators. The editor, Mr. J. Stephen Jeans, who wrote 330 pages of the report, was particularly well equipped for his work by an acquaintance of some years with American iron trade developments, acquired in part by visits to this country, and in a long career as editor of an iron trade journal and writer on industrial and economic questions. With him were associated Ebenezer Parkes, M. P., president of the British Iron Trade Association; Enoch James, a British steel works expert, and Axel Sahlin, the well known engineer of Swedish birth and of long experience at American blast furnaces, who is now carrying out American ideas at Millom and Askam furnaces in Cumberland, Eng. Mr. Sahlin's vigorous and alert habit, and his technical instinct and training are in evidence in the chapters he wrote for the book. His close acquaintance with American methods and his thorough sympathy with the American habit of thought and action are also conspicuous.

In the division of the work of the commission, Mr. Jeans took the investigation of general economic and industrial conditions, and upon him fell the brunt of the work of writing and editing. Mr. Sahlin investigated blast furnace practice and the questions of iron ore and fuel supply, transportation, and the engineering problems involved in the handling and assembling of blast furnace materials. He writes 60 pages of the book. Mr. James reports on steel works plant and equipment in the United States, giving one chapter to the Bessemer process, another to open-hearth works, a third to features of American rolling mills and a fourth to labor conditions. These chapters take up about 50 pages. Mr. Parkes, in a 15-page contribution, speaks of the bar and sheet mills, these lines of operations being particularly interesting to him, and devotes some attention to "Vandergrift, the model town." In addition to these four reports there are appendices containing tables, data, shop forms, etc., amounting to 50 or 60 pages. The volume is plentifully illustrated. Mr. Jeans's portion containing 78 plates, Mr. Sahlin's 44, Mr. James's 25 and Mr. Parkes's 6—these in addition to four folding plates.

The book fully bears out the statement of the writers that every facility was given them by the steel companies and other manufacturers to gather the data they sought. Views of machinery and of blast furnace, steel works and rolling mill equipment are plentiful, and there was no withholding details of output, labor and material costs, and the minutiae of practice that would make an interesting study to British steel masters and engineers. As a photograph of the American iron industry in 1901 the work is of great interest to American readers as well as to the audience for whom it was prepared. Certainly in no publication extant has so much valuable material been brought together, representing the achievement of engineers and managers in the development of iron and steel manufacture to their present pre-eminence in this country. One would need to explore the files of technical journals and the annals of our engineering societies for the past decade to get any approximation to the comprehensive picture of American achievement in iron and steel making presented in these reports.

Time and space are lacking now for any adequate review of the reports. Extended extracts must be given to convey a proper idea of their spirit and scope. All are thoroughly appreciative of American achievement, and world records are detailed and economizing machinery described with full credit to the enterprise and courage that have contributed so largely to American pre-eminence. There is little or no attempt to make comparisons with British practice. The aim has been evidently to appeal to British pride and stimulate effort for the recovery of lost ground, by giving a faithful picture of the American steel industry as it stands today, with some analysis of the factors that have contributed most largely to American success. There is nothing pessimistic in any paragraph of the book. The commissioners evidently concluded that pessimism had had its too long day in the discussions of British and American industrial conditions that have filled British prints in the past two years. The style of the London *Times* writer, who unsparingly lashed British shortcomings, is in sharpest contrast with the judicial and reportorial method of the four commissioners.

Something of the broad compass of Mr. Jeans's work, which is marked by the fidelity that has characterized all his contributions to economic literature, will appear from the following titles of some of his chapters: Raw Materials, Labor Conditions in the United States, Organization and Administration of Industrial Affairs, Transportation Systems and Conditions, Cost of Producing Iron and Steel in the United States, Manufacture and Treatment of Finished Steel Products, Trusts and Consolidations, The Basic Steel Industry, Collateral Interests, Some Economic Problems, with a concluding chapter on Canadian Iron and Steel Industries and Canadian Competition.

Possibilities of Reaction.

Mr. Jeans evidently believes in the repetition of history. In the face of the abounding prosperity of the iron trade in the United States today, he would have his readers remember that while there is a capacity for producing 24,000,000 to 26,000,000 tons of pig iron a year in the United States, "it is not more than eight years since the pig iron consumption of the United States fell to little over 7,000,000 tons a year, or considerably less than one-half of that of today." The cycle idea, rather than that of a steady expansion of the world's demand for iron, was in his mind when he added to the above the sentence, "If a productive capacity of 24,000,000 to 26,000,000 tons of pig iron were brought face to face with a demand for only one-third of that quantity, with a corresponding relation of demand to capacity in all other branches of the iron and steel industries, some strange things would be likely to happen." However,

this statement is qualified by saying that there is no chance, under any conceivable circumstances, of all the pig iron capacity of the United States being utilized at the same period.

Discussing the possibilities of profit to the steel works of the United States, when the present prosperity gives way to depression, Mr. Jeans says, referring particularly to the United States Steel Corporation:

"Speaking generally, as compared with the slump period of 1895-98, the average prices of 1901 show an advance of about 25s per ton on pig iron and 40s per ton on rails, blooms and billets. The steel corporation has therefore had the most of this difference to the good, in addition to the profits earned in the low price period referred to, for it will not be overlooked that, controlling as they do their raw materials and transport, they are not liable, like concerns otherwise placed, to have these advanced in price *pari passu* with advances in the prices of manufactured products. An increased profit of 25s per ton on the pig iron capacity of the corporation would alone yield over £10,000,000 sterling and this sum may not unreasonably be doubled to represent the further profits that may be charged to the differences in the prices of finished steel. Here, then, we have, as compared with the prices that have actually prevailed in times of depression, a possible increase of profit of not less than 20 millions a year, which difference alone would be sufficient to yield about 9 percent per annum on the whole capitalization of the corporation. * * * Is it not justifiable to assume that if the steel corporation only earned £11,000,000 sterling as net profits in six months of such good trade as that specified [the first six months of its existence] when they might be expected to have a chance of earning at least £20,000,000 sterling a year in excess of the actual prices current in depressed times, the apparent possible profits under ordinary conditions and former prices in those times would *ex hypothesi* not exceed £2,000,000 sterling, subject to modifications in wages and a few other charges, which would hardly do more than pay 2 percent on the £110,000,000 of 7 percent cumulative preferred stock? And if the corporation had to face six or seven years of bed-rock prices on these terms where would its prosperity be, and how would its chances of continued life be affected?"

Mr. Jeans brings up these considerations as bearing on the question of the probability that the steel corporation will dump large quantities of steel at or below cost on foreign markets. His inference is that the corporation must have large profits on all it produces and hence cannot afford to slaughter much material abroad. He admits that the steel corporation, by new economies, may show greater profits later, and this coincides with the fact. In the past year economies that mean $9,000,000 a year have been introduced, and more are to follow. But the most serious fault in his statement is in considering the prices of 1895-98 as representing the basis of "possible profits under ordinary conditions." The years cited were those of the lowest prices the American iron trade ever knew; in that regard they were not ordinary, but most extraordinary. Like attempts that have been made in many discussions of the question in this country, this effort to predict the status of the United States Steel Corporation in a time of slackened demand is futile, because the entire complexion of the American iron trade has been changed by the events of the past three years, and the factors to be reckoned with are not duplicated in any record the industry has made. Any deduction of a limitation upon the ability of the steel corporation to place steel abroad in large quantities and at prices that will prove exceedingly uncomfortable competition to the English steel industry, will scarcely stand, in the face of the declared intention of the heads of the corporation, speaking from knowledge, to make such shipments freely when occasion requires. The results of the Carnegie Steel Co.'s policy in the depression of the middle nineties, when its mills were run at full capacity and material marketed at "any price to take the business" were such as to give the greatest encouragement to the steel corporation officials to repeat it, from the standpoint of profits and from every other.

Mr. Jeans, judging from the above and from some other passages in his report, has not imbibed in any large degree, the American faith in the expansive future of steel, not only in the United States but in all the world. It is the tremendous swing of steel toward greater things which impresses the American captains of the industry, in studying its history and its tendencies, rather than the temporary set-backs that in every case have been followed by new and prodigious forward leaps. Yet Mr. Jeans does not ignore the steadying influence of so great an organization as the steel corporation. For he says on one page of his report: "The steel corporation now supplies a mechanism for steadying values which has never before existed. That great organization is fully aware of the ultimate value of their resources in raw materials and otherwise, and they are not likely under pressure of panic or financial stringency to part with their property in any shape or form for less than its normal value."

Management and the Personal Factor.

It is interesting to note the keen appreciation the members of the commission have of the features of American superiority that cannot be conveyed in descriptions of plants or statements of records and economies and details of mill and furnace practice. In the chapter on "Organization and Administration," Mr. Jeans goes quite fully into the human elements of American eminence in iron and steel making. He found that American proprietors and managers get to their posts earlier in the morning than do those in Great Britain, and he cites instances of his personal observation as bearing on "the early and industrious habits of the Americans." He notes also that "the keener rivalry and the more aggressive ambition to succeed leads to less consideration for the feeling and fortunes of 'the other man' than is prevalent in Great Britain." Concerning the working habits of Americans Mr. Jeans says:

"The typical American appears to live only to work, and to work at something that will be a life-long career of usefulness to himself as an individual, and to the community as interested in mechanical improvements and economies. In the great manufacturing cities a man who has no regular business, who is not concerned in the development of some industry, who is not an agriculturist, a railway man, a manufacturer, or engaged in a profession, is more or less at sea. He will find it much more difficult than in any European country to get men of character, capacity and intelligence to share his leisure in ordinary working hours, however learned they may be."

Mr. Sahlin makes much also of the human element in the success of Americans in steel-making. He says, for example:

"In America, the personal factor in iron making is recognized as to be fully as important as that of plant. It is not the guns which win the battle, but the men who stand behind them. A good weapon, poorly aimed, is not dangerous, but neither will it do to arm good fighters with obsolete guns. In the above report I have tried to show that the guns—that is, the plants—are splendidly and powerfully equipped, that raw materials are plentiful and good, and that the system of transportation and handling is unexcelled. In this chapter I wish to speak of the men as I have learned to know them during 20 years of association. * * * I have often heard it erroneously stated that the Americans worship dollars. This is not so, because a rich man as such is not greatly esteemed. What the American admires and honors is the ability to do; that capacity in a man, through his own sagacity, nerve, enterprise and skill to create and employ a fortune. Nobody in America seems to feel above his work or degraded by it. As it is done, and as is the result obtained, so is the man esteemed by his fellow men, and such is the place he will make for himself in his community or in his country. Everybody works, and works for the sake of work; and thus there has been produced in America in the short space of one generation an industrial potentiality which is more wonderful and more to be feared than the works and plants which these same workers have created. Nowhere is the struggling youth more kindly encouraged, more readily trusted, more generously aided, more gladly made place for, than in America, and when I say this I speak from personal experience, and with gratitude in my heart toward many of those busy and keen, but also generous and broad-minded American men of affairs."

American Competition.

Referring directly to the future of American iron and steel products in foreign markets, Mr. Jeans cites the prophecy of Sir Lowthian Bell in 1891, that "if we are to meet American iron in Europe, Asia or Australia, it will be that produced in the Southern States of the Union," and recalls how soon it

proved unreliable. In general he says that Pittsburg iron, with a delivered cost of 59s 7d at an English industrial center, was higher by about 20s 6d at the time the report was written, than the British product. The protection to British manufacturers is represented in two land freights and the ocean freight, the three amounting to about 20s 6d. He cites iron and steel and machinery exports from Great Britain in the past five years amounting to £48,040,000, as against £18,519,000 as the value of like exports from the United States in the same period and argues that the United States is "still a long way from having come alongside, to say nothing of having wrested the supreme position from Great Britain." Elsewhere he says:

"In considering the natural conditions at the command of the United States for the development of an export trade, it is not likely to be overlooked that in that country there are only two steel plants on tidewater—one at Sparrows Point, Baltimore, and the other near Wilmington, Del. The ore for these plants is brought long distances oversea. During the last three years much of it has been obtained from Canada and some of it from Cuba. Neither of these concerns have bituminous coal within 200 miles of their furnaces. The principal group of works that have hitherto done the bulk of the export trade, in finished products especially, is in the Pittsburg district, nearly 500 miles from New York, which is their principal shipping port, although Birmingham, Ala., which is looking forward to the development of an export trade in finished products, as well as in pig iron, is little more than half that distance from ports that are likely to have a future. Meanwhile at these Southern ports the command of tonnage is uncertain and precarious."

Mr. Jeans is inclined to the view that the potentiality of resisting American competition is in the British iron industry, and what is more will be developed into actual resistance. He says:

"The conclusion to be drawn from the recent attitude of British iron and steel manufacturers in regard to new improvements appears to me to be favorable to the future of those industries. Probably no authorities have taken greater pains to inform themselves as to that future, as liable to be influenced by American competition, than those who have been concerned in the recent consolidations in South Wales. Have these gentlement sat down and folded their hands despondingly? Have they not been stimulated by what they saw and learned in the United States to take steps which implied a large amount of confidence in the future? And is not the same inference justified by similar action on the part of many other leaders of the trade, including those responsible for the destinies of that almost historic corporation—the Weardale Steel, Coal & Coke Co.?"

Mr. Sahlin believes the menace of United States Steel Corporation exports to be a very real one. Referring to Mr. Schwab's statement that the policy will be to keep the plants going at their full output and sell abroad what cannot be sold at home, even exporting at a slight loss if necessary, he says:

"The steel corporation controls a practically unlimited capital, and the best mines, the best coke, the best plants, the best lines of communication, the ablest managers and the most perfect selling arrangements. When the great syndicate deliberately decides to sell a certain small percentage of its enormous output at cost, or even at a loss, in our own territory, such an action will be apt to demoralize our prices, and to send us through such a period of reorganization, failures and destruction of capital as America experienced in the long-to-be-remembered years between 1893 and 1897. But as America, during these years, after learning the dearly bought lesson, pulled itself together and created the present successful organization of its iron and steel busines, so, I have no doubt, will Great Britain do."

But Mr. Sahlin reassures his British readers as to the Cleveland District and other leading steel-making centers, in the following:

"There is no point in the world that need teach Middlesbrough a lesson in the cheap production of iron and steel. The Durham coke, if properly made, is equally good, if not better than that of Connellsville. The collieries and coke ovens are nearer to the Tees than is Connellsville to Pittsburg. The Cleveland hills yet contain a goodly store of iron ore, if also the grade is going down. To enrich the mixtures the Scandinavian mines, considerably nearer to Middlesbrough than are the Lake Superior fields to Pittsburg, supply an even richer and better raw material. In the opposite direction, Spanish hematites are available with easier transport than that of the lake ores. Middlesbrough has also the advantage over Pittsburg of being located on the sea, and in the midst of the densely populated European countries. If, therefore, the Middlesbrough ironmasters adapt—not copy—American methods, not only as regards furnace plants and steel works, but also and of still more importance, as regards generous employment of money, consolidation of interests, control of raw materials, selection of managers and treatment and control of labor, they should never need fear competition from an industrial center situated 3,500 miles away from the markets at their very door, and this opinion, I take it, will also hold good for South Wales, the Midland Districts and Scotland."

As occasion may permit, further reference will be made to features of this most valuable report, which will be read with great interest on both sides of the Atlantic. It does not make recommendations. It rather holds up the mirror before American iron and steel works. The exhibit is one of fascinating interest, and there is nothing in it to beget a sense of security in British readers. Whether its optimism is justified remains for British ironmasters to demonstrate.

OBITUARY.

Alexander W. Adair, secretary of the Shenango Furnace Co., of Pittsburg, and one of the confidential men employed by W. P. Snyder & Co., of the same place, died on July 5, at the home of W. P. Snyder, Sewickley, Pa., from injuries received the day previous while setting off fireworks. Deceased was widely known as one of the most progressive of the younger

ALEXANDER W. ADAIR.

men engaged in the iron and steel business in the Pittsburg district. He had been connected with the firm of W. P. Snyder & Co. for the past six years and in this capacity built up a large acquaintance with the iron and steel factors throughout the country. Before becoming connected with this firm he was in the employ of the McClure Coke Co. Mr. Adair was 36 years old and unmarried. His father, James Adair, was connected with the firm of Hussey, Howe & Co., of Pittsburg, for many years.

The Western Wire & Bale-Tie Co., of Kansas City, Mo., has been incorporated for $100,000 under the name of the Western Steel & Wire Co. The directors of the new company are: Arthur H. Symons, chairman, Roy A. Henley, J. Henley Symons, John H. Kane, and Frank D. Parrent. The company will manufacture, beside plain wire and bale-ties, woven wire fence and steel wire springs. The company will have its main office in Chicago and has arranged to build a wire-drawing and galvanizing plant in the Chicago district, the exact location not having been determined. The Kansas City business will be continued as heretofore, with the new products added. A tract of land in the West Bottoms has recently been purchased and plans have been drawn for the building of a warehouse 65 by 200 feet. The directors of the company are all under 30 years of age, but have grown up in the wire business and are practical steel men, each having proven his worth in some line of the business. The Western Wire & Bale-Tie Co. under the management of the Symons Brothers has been quite successful.

The Michigan Malleable Iron Co., of Detroit, broke ground July 7 for an addition of three foundries. This added to its present capacity is expected to make this company the largest producer of malleable castings in the United States. The new works will be equipped with electricity and all modern labor saving devices employed in foundry operations.

TREADWELL HOT METAL CARS.

The two illustrations herewith are of a large hot metal car, built at the Lebanon (Pa.) works of M. H. Treadwell & Co., 95 and 97 Liberty St., New York. It is of steel construction and of special design for the transportation of materials in and around furnaces, rolling mills and steel plants. Fig. 1 shows a hot metal car of standard gauge which was designed

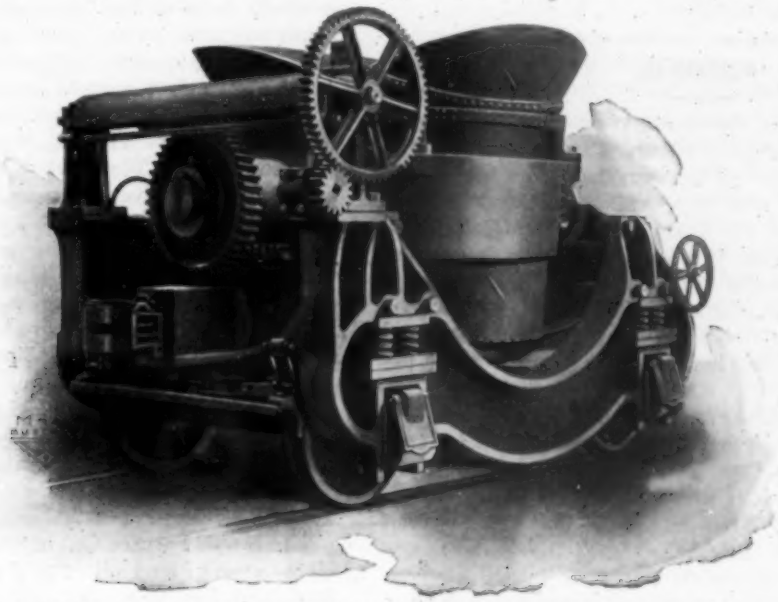


FIG. 1.—15-TON HOT METAL CAR BUILT BY M. H. TREADWELL & CO., NEW YORK.

to carry 15 tons of molten metal and built for heavy and continued service at converters, open-hearth furnaces, pig casting machines and for the transferring of molten metal in ladles for direct process. The construction is such that the ladle can be turned on its axis by a train of intermeshing gears, thus dumping its contents on either side of the track. This is accomplished by the lateral movement which the bale holding the ladle has on the car trucks supporting it.

The operating mechanism consists of cut steel pinions, gears, worm wheels and machine cut wrought iron worm. The entire car with the exception of the wheels, car boxes and brasses, is of steel construction. One man can operate the racking device by turning a crank handle inserted in the small pinion as shown. This pinion meshes in the large gear wheel which turns the worm shaft, and this in turn drives the large worm wheel attached to one of the trunnions and concentric with the rolls on both trunnions. The movement tips the ladle and at the same time causes it to travel sidewise so that the contents can be dumped as far from the rail as may be necessary.

To prevent the ladle from getting out of alignment, a rack is attached to the side of each runway, and gear wheels mesh with these racks and are keyed securely to the rolls. The ladle is shown in its upright position, with its center line directly over the center line of the track. In operating the dumping device the center line of the ladle will move off the center line of the track on that side on which it is tipping. The truck of the car is of massive construction. The side and end frames are of heavy steel construction and being connected,

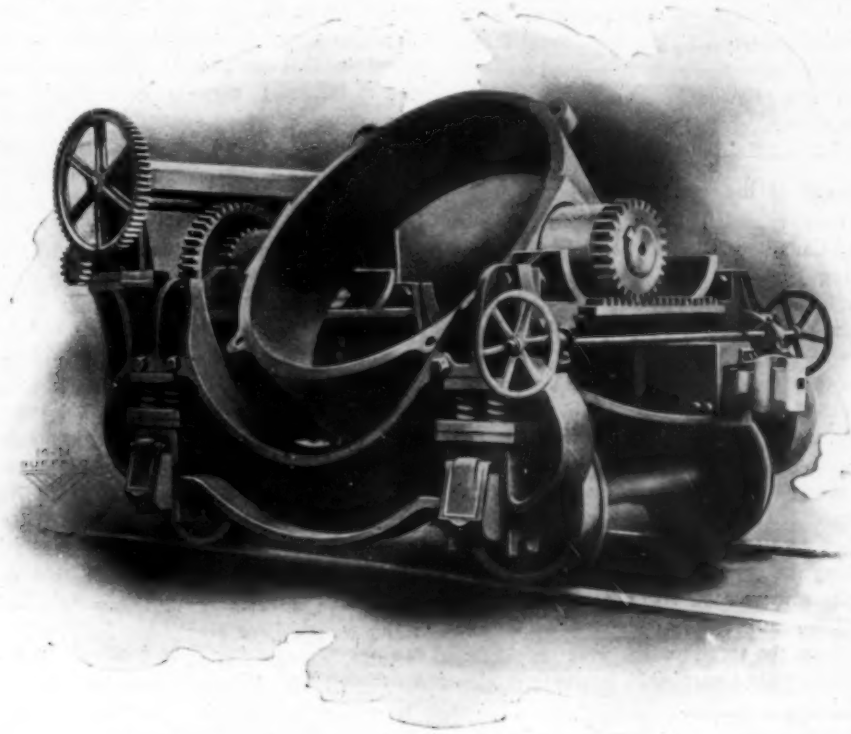


FIG. 2.—15-TON HOT METAL CAR TILTED AND WITHOUT THE LADLE.

serve to make the body of the car one continuous member, eliminating or distributing the disproportionate strains which are carried by the bales supporting it.

The chilled cast iron wheels, steel axles, journal boxes, brasses, springs and automatic couplers are of standard M. C. B. type, allowing substitutions of any ordinary standard articles of these classes. All parts are made interchangeable. A hand brake is used on the car, operated by a hand wheel shown on the end of the car and can be worked from either

side. The ladle is of standard size constructed of heavy plate and lined with fire brick.

Another distinctive point of this car is the general design, which is intended to reduce to a minimum the possibility of dismemberment of the parts, due to shocks received in coupling or unavoidable collisions, insuring at the same time unusual service. An idea of the very solid and substantial construction of this car is given in the fact that the empty car weighs 60,000 pounds.

PERSONAL.

At the meeting of the American Association for the Advancement of Science held at Pittsburg, Pa., last week, George Westinghouse was elected an honorary fellow, an honor conferred only upon a few men who have accomplished much in scientific research. Prof. Ira Remsen, president of John Hopkins University, Baltimore, Md., was elected president of the association for the ensuing year and H. B. Ward, of the University of Nebraska, general secretary.

Peter D. Wanner has resigned as manager of the Reading Foundry, Reading, Pa. He has acted in this capacity for the past 20 years.

H. L. Bricker, chemist at the Bessemer plant of the Republic Iron & Steel Co., Youngstown, O., has assumed charge of the laboratory of the Ohio plant of the National Steel Co. at the same place. Frank Hirsh, who has been chemist at the Haselton furnace of the Republic Iron & Steel Co., has been appointed to succeed Mr. Bricker.

During the past two weeks the important executive affairs of the American Bridge Co. have been directed from a suite of rooms in the Hahnemann Hospital, at Philadelphia, where the company's president, A. J. Major, has kept constant vigil at the bedside of his young son, who was recently so seriously injured by the explosion of a blank cartridge that amputation of a hand was necessary.

J. B. Stubbs, of Runyon, Stubbs & Co., Cleveland, returned home this week after an absence of six months. Mr. Stubbs spent three months in California and then visited Japan and China.

R. D. Kuhn, for many years manager of the Park Steel Co.'s branches at Cleveland and Chicago, has been appointed special agent of the Crucible Steel Co. of America, with headquarters in the Frick Building, Pittsburg.

Tonnage at the Soo.

The largest tonnage ever recorded for one year passed through the American and Canadian canals at Sault Ste. Marie, Mich., for the year ending June 30, 1902. The necessity of constructing a new lock to accommodate the traffic is made more apparent by these statistics. The records show that since June 30, 1901, to the end of June this year, freight to the amount of 33,122,446 net tons passed the canals. The report for June this year shows that notwithstanding the blockade of nearly a week, caused by the accident to the railroad swing bridge, only one other month in the canal's history (July of last year) exceeds the volume of business transacted. The tonnage for the month amounted to 4,721,608, as against 4,519,075 for the same period of 1901.

The total tonnage passing the canal this season is 11,486,501 as against 6,767,120 for the same period last year, an increase of 4,719,381 tons. Should the same ratio of increase be shown for the balance of the season the total for the year would be over 40,000,000 tons. This is quite improbable, however.

207,000 Tons of Rails for Pennsylvania Railroad.

The Pennsylvania Co. announces that orders for steel for the lines East and West for 1903, amounting to 207,000 tons have been placed as follows: United States Steel Corporation companies, 110,000 tons; Cambria Steel Co., 38,500 tons; Pennsylvania Steel Co., 38,500 tons; Lackawanna Iron and Steel Co., 20,000.

The bell weld furnace at the plant of the LaBelle Iron Co., Steubenville, O., last week broke all former records for a furnace of this kind by producing 10,110 lengths of ¾-inch pipe in 22 hours.

LAKE SUPERIOR IRON MINES.

It is reported at Duluth that negotiations are pending for the sale of the State lease controlled by the Elizabeth Iron Co. in section 12-57-21, one-half mile south of Hibbing. The rumored consideration is $400,000. The lease of the property is controlled by J. P. Morrow, J. T. Michaud, E. S. Palmer and others, of Duluth, and P. L. Kimberly, of Sharon, Pa. It is generally believed that the property will soon fall into the hands of some strong operating company. The deposit is now known to exceed 10,000,000 tons. The lease covers three forties, and only a part of one forty has been explored. It is now known as the Elizabeth mine.

Fred Ranson, of Virginia, Minn.; J. W. Falk, of Eveleth; Hanson Smith, of West Duluth, and Axel Carlson, of Duluth, are reported to have shown up an extensive body of ore in the north half of the southeast quarter and the southeast quarter of the southeast quarter of 13-58-20. The property is now an assured mine. It is situated close to the Iron Chief on the north side and to the Consolidated on the west side.

Pickands, Mather & Co. have let a contract for the stripping of the Albany mine near Hibbing, Minn. The work involves the removal of nearly a half million cubic yards of surface.

Recent explorations at the old Cloquet mine at Eveleth have revealed a better quality of ore than has ever been produced at that mine. The Cloquet, after being all but condemned several times, was sold to the Consolidated company shortly before the formation of the Steel corporation.

The Zenith Furnace Co., of Duluth, has bought the lease to eighty acres of land adjoining the Cincinnati mine at Biwabik. The land has been explored and contains not less than 1,000,000 tons of Bessemer ore. It is expected that this purchase will be followed by others, as the company has decided to provide for future ore supplies.

The Cleveland-Cliffs Iron Co. is reported to be negotiating for the famous Section 30 property in Minnesota. It has no Mesabi or Vermillion range property as yet.

The Republic Iron & Steel Co. is to open a new mine on the Mesabi range and has let a contract for stripping 1,000,000 cubic yards of material. This will consume three or four years in completion and will uncover about 7,000,000 tons of good ore that can then be mined at a very small cost, probably not to exceed 10 cents a yard. At the present time five stripping mines are being opened on the Mesabi range.

Owing to a flood some time ago, the Sharon Steel Co.'s mine on the Mesabi range has suffered severely and instead of the expected production of 250,000 tons for the year, it will reach less than 100,000 tons.

The Oliver Iron Mining Co. is employing 500 men at its Negaunee mine, where on July 7, 1901, so many men lost their lives by a cave in. The mine has settled firmly and is now apparently safe.

The Michigan mine, Menominee range, has been closed by the Oliver Mining Co., and will be abandoned for this year.

Dan W. Kaufman, of Marquette, who is building a new across-lake line via Northport and Manistique, claims that the new route from lower Michigan points to Duluth will be 75 miles shorter than the present shortest route. Mr. Kaufman has given an order to the American Shipbuilding Co. for the first of two immense car ferries, which will be ready for service at the beginning of navigation next April. Each ferry will have a capacity of thirty cars, and will be about the same as the Pere Marquette ferry, which was turned out last winter, except that it will be equipped with more powerful engines. The ferry will also have passenger accommodations. It will cost $500,000. Mr. Kaufman says that it is possible for the Manistique, Marquette, and Northern R. R. to handle ore down from Manistique, or possibly Duluth, and to handle coal back, all rail, by the use of this ferry, and thus for the first time in the history of the great lake trade bring the all-rail competition directly opposed to the boat lines into a trade that boats have hitherto monopolized. The route would be the South Shore from Marquette to Singleton, the M., M. & N. to Manistique, the ferry to Northport, the new T. C., L. & M. to Traverse City, and the Pennsylvania or its connections through to the valleys or the Pittsburg district.

The Lorain Steel Co. is about to make a shipment of rails for the Auckland electric traction system of Auckland, New Zealand.

STOVE FOUNDERS' AND METAL WORKERS' AGREEMENT.

Representatives of the Stove Founders' National Defense Association, in conference at Chicago last week with representatives of the Metal Polishers,' Buffers' and Platers' Union, drew up an agreement which puts the two organizations on substantially the same footing on which the Stove Founders' and the Iron Molders' Union have been for 11 years. Those present at the conference on behalf of the S. F. N. D. A. were C. H. Castle, Quincy, Ill.; Henry Cribben, Chicago; D. S. Prizer, Reading, Pa.; Jeremiah Dwyer, Detroit, and D. McAfee, Quincy, Ill. The officers of the union, particularly President E. J. Lynch, have been agitating the proposal for an agreement for the past two years. The following is the text of the document drawn up at Chicago and signed by the representatives of the two organizations:

"With the view of promoting harmony between the members composing the Stove Founders' National Defense Association and the Metal Polishers', Buffers' and Platers' Union in all matters affecting their joint interests, and providing the means for adjusting any grievances that may arise, we hereby signify our desire to adopt the principle of conciliation and arbitration upon equitable lines in such form and manner as may be hereafter mutually agreed upon, and we recommend as follows:

"1. That a conference committee be formed, consisting of six members, three of whom shall be appointed by each organization to hold office for one year or until their successors are appointed.

"2. Whenever there is a dispute between a member of the S. F. N. D. A. and the members of the M. P. B. and P. U., when a majority of the latter [the employes] are members of said union and it cannot be settled amicably between them, it shall be referred to the presidents of the two associations before named, who shall themselves, or by delegates give it due consideration. If they cannot decide it satisfactorily to themselves, they may, by mutual agreement, summon the conference committee, to whom the dispute shall be referred, and whose decision by a majority vote shall be final and binding upon each party for the term of twelve months. Pending adjudication by the presidents and conference committee, neither party to the dispute shall discontinue operations, but shall proceed with business in the ordinary manner. In case of a vacancy in the committee of conference, it shall be filled by the association originally nominating. No vote shall be taken except by a full committee or by an even number of each party."

Decrease in Vessel Tonnage.

During the fiscal year ended June 30, 1902, the bureau of navigation reports that 1,656 vessels of 473,081 gross tons were built in the United States, compared with 1,079 vessels of 498,616 tons for the previous fiscal year. The decrease in tonnage is in sailing vessels, canal boats, barges, etc. Included in the total new tonnage are 94 vessels, each over 1,000 tons, aggregating 315,062 tons, or two-thirds of the output. Of this large construction, 41 steel steamers of 158,631 tons were built on the great lakes.

The output of completed steel steamers on the seaboard has been much below the indications of last July. The launching of nearly every large steamer has been delayed from three to eight months and some are still on the ways. The delays have been partly due to the steel strike last summer and to the great demand for structural steel in all directions, to low ocean freights and the lack of new ship-building orders which has left builders and owners without motive for haste. Last July 255,000 tons of ocean steel steamers were under construction or under contract, while at present only about 160,000 tons are under construction and no new large seaboard contracts are reported.

The Crown Iron Works, Minneapolis, now located at Second Ave. Southeast and Second St., will move farther southeast. Driven from its present position by lack of room the company has purchased land near "Little Pittsburg" and will build on the new site.

LOW CARBON FERRO-CHROME.

An interesting communication on the production of high percentage chromium was sent recently to the *Chemical Trade Journal*, of London, by Geo. G. Blackwell, Sons & Co., Ltd., of Liverpool. It was suggested by remarks of Dr. Goldschmidt at a meeting of the union of German Metallurgists at Dusseldorf. The Messrs. Blackwell say:

"The question of the manufacture of steels with a high percentage of chromium and low percentage of carbon is of real importance, and the steels shown at the Paris Exhibition by Messrs. Jacob Holtzer and Co., with from 5 percent to 30 percent of chromium and about 0.40 percent carbon, have proved their real value and excellence. It is true that ordinary ferro-chrome, with 60 to 70 percent chromium, contains from 6 percent to 10 percent of carbon, and that the chrome is present in these alloys as a carbide of chromium. With these ferro-chromes it is impossible to produce steels with from 5 percent to 20 percent of chromium and only 0.25 percent to 0.45 percent carbon, but we placed on the market, more than two years ago, an alloy of chromium and iron, called 'Refined Ferro-chrome,' containing 67 to 70 percent chromium and 0.5 to 1 percent carbon. This alloy contains more than 99 percent of ferro-chromium (that is to say, of purity) and less than 1 percent of carbon and other foreign constiutents, and has a great advantage over 'pure' fused chromium. It is very fusible.

"It is very difficult to introduce chromium into a steel bath by using 'pure' chromium, especially the chromium free from carbon. The pieces of metal float on the bath, and only melt with great difficulty, and there is always the danger in steel made with this metal of finding the chromium irregularly alloyed. After long trials, we have establshied that the alloy *par excellence* in every respect is one of the proportions of about 67 to 70 percent chromium and 30 to 33 percent iron, with less than 1 percent carbon It is an alloy which melts quite easily, and allows of the introduction of chromium into the bath with the certainty of producing steel of regular quality, high or low in chromium, with very little carbon. For instance, each kilogram of ferro-chrome, with 70 percent chromium and, say, 1 percent carbon, adds 0.7 percent chromium and 0.01 percent carbon per 100 kilograms of steel; therefore it is an easy matter to produce, by this means, steels with a high chromium content and very low in carbon.

"'Pure' chromium has a further great objection. It contains 96 to 98 percent chromium (*i.e.*, purity) and the rest is the impurities, the greater portion consisting of aluminium, and it is well known that aluminium in such quantity is a great objection. There is the same objection to ferro-vanadium, and the difficulties presented by the presence of aluminium in this alloy have been established by Professor Arnold, of Sheffield. Dr. Goldschmidt, in saying that these steels, high in chromium and low in carbon, can only be made with 'pure' chromium, evidently was unaware of the existence of the refined ferro-chrome. In introducing chrome into steel in such high percentages, it is evident that the price of the chromium unit is of the greatest importance, and this is a further reason —and a very strong one—for the employment of refined ferro-chromium instead of the 'pure' chromium, because the unit of chromium in refined ferro-chromium costs less than in the chromium metal (called 'pure'), 96 to 98 percent.

"Since the introduction of this refined ferro-chromium, the production of high-chromium low-carbon steels for tool steel, shell points, armour piercing shells, armour plates, crusher steel, and steels destined to take the place of high nickel steels, has very much increased, both in England, America, and Europe, and the relatively low price of this interesting alloy permits of its use in large quantities."

Casamitjana Brothers, of Barcelona, Spain, are desirous of establishing business relations with American manufacturers of lathes, boring machines, screw lapping and cutting machines, machines for sharpening and setting center bits, files, bits, taps, augers, borers, mandrels and all sorts of other tools for mechanical construction. The Spanish concern is said to have filled such requirements hitherto through English, French and German sources.

PER CAPITA CONSUMPTION OF PIG IRON.

In the Annual Statistical Report of the American Iron and Steel Association from which we quoted in our issue of June 26 an interesting feature is the computation of the consumption of pig iron in the United States last year, and the comments of General Manager Swank on the per capita consumption not only of pig iron but of the old material that entered into the finished iron and steel used in the year. We quote the following:

"Our consumption of pig iron in the last five years is approximately shown in the following table, the comparatively small quantity of foreign pig iron held in bonded warehouses not being considered. Warrant stocks are included in stocks unsold.

Pig Iron—Gross tons.	1897	1898	1899	1900	1901
Domestic production.....	9,652,680	11,773,934	13,620,703	13,789,242	15,878,354
Imported.....	19,212	25,152	40,393	52,565	62,900
Stocks unsold, Jan. 1.....	847,686	874,978	415,333	68,309	446,020
Total supply.....	10,519,578	12,674,064	14,076,429	13,910,116	16,387,304
Deduct stocks Dec. 31....	874,978	415,333	68,309	446,020	73,047
Also exports.....	262,686	253,057	228,678	286,687	81,211
Approxi'te consumpt'n	9,381,914	12,005,674	13,779,442	13,177,409	16,232,446
Increase in consumption in 1901, as compared with 1900, gross tons.....					3,055,037

"The per capita consumption of pig iron in the United States in any given year may be approximately ascertained by adding to our total production of pig iron in that year our imports of pig iron in the same year and deducting our exports of pig iron in that year and by allowing for an increase or decrease of unsold stocks, which will give us our total consumption in tons; this total can be reduced to pounds and divided by our total population as ascertained at the nearest census enumeration. We have no statistics of unsold stocks of pig iron prior to 1874.

"Taking our population at the three census periods from 1850 to 1870, inclusive, and omitting our exports at each of the corresponding calendar years, which were only nominal, and necessarily omitting all consideration of unsold stocks, we have the following results for the calendar years 1850, 1860, and 1870. For the calendar years 1880, 1890, and 1900 we have more precise results, as stocks of unsold pig iron at each of these periods were ascertained, while imports and exports of pig iron are both considered, the imports being important in 1880 and 1890 and the exports consti tuting a considerable factor in 1900. The population factor is for the corresponding census years. For the year 1901 we have considered all the elements of consumption above mentioned, but have been compelled to estimate the average population of the year, which we place at about two million souls above the census enumeration of 1900.

Calendar Years.	Population (Census Year, except 1901).	Production, Gross tons.	Imports, Gross tons.	Exports, Gross tons.	Consumption, Gross tons.	Consumption per capita, in pounds.
1850	23,191,876	563,755	74,874	.....	638,629	61.6
1860	31,443,321	821,223	71,498	.....	892,721	63.6
1870	38,558,371	1,665,179	153,283	.....	1,818,462	105.6
1880	50,189,209	3,835,191	700,864	1,871	3,988,544	176.0
1890	62,979,766	9,202,703	134,955	16,341	8,943,335	318.1
1900	76,303,387	13,789,242	52,565	286,687	13,177,409	386.8
1901	78,303,000	15,878,354	62,930	81,211	16,232,446	464.4

"The above exhibits are for pig iron only. If, however, an inquiry were to be made concerning the total consumption of iron per capita—not pig iron only, but also everything that takes the place of pig iron in obtaining finished products, that is, all kinds of cast and wrought scrap and old iron and steel rails, the consumption of which amounted to several million tons per annum in recent years, we would find that the capita consumption above given would be increased in the later periods but would not be materially increased in the earlier periods, when we had no open hearths to require large quantities of old material and when the foundries and rolling mills used only small quantities of cast and wrought scrap respectively.

"In the above calculations it has been assumed that pig iron converted into finished forms of iron and steel and exported to other countries, some of it as machinery and in other highly manufactured forms, is really *consumed* in this country, but technically it is not. Upon the other hand we have not considered the machinery and other finished forms of iron and steel that we have imported. We have followed the usual method."

International Steam Pump Co.'s Report.

The International Steam Pump Co. has issued its statement of operations for the year ending March 31, 1902. The net profits for the year were $1,510,488. After deducting preferred dividends, the surplus was $734,436. The previous surplus was $1,493,468, making the total undivided profits $2,227,904. The increase in fixed assets as a result of improvements or acquisition during the year was $1,128,948. The current assets amount to $6,634,490. In view of the fact that the principal shops of the company were shut down for three months on account of the machinists' strike of 1901, the above showing is considered very satisfactory.

In the course of his remarks to the stockholders President John W. Dunn says: "The manufacturing plants of the company have been taxed to their utmost to meet the increased demand. The orders on hand at the present time are largely in excess of the capacity of the works. During the year just closed the orders taken have been over 41 percent in excess of the orders taken during the preceding year. The unfilled orders at the end of the present fiscal year amount to $5,750,000, which is $3,500,000 in excess of the unfilled orders on March 31, 1901. It has been found necessary to substantially enlarge the plants. Additions have been made to some of the shops and the erection of extensive new works has been begun at Harrison, N. J., for the Worthington Co., which will largely increase the present capacity of the Worthington plant. It is intended that the new works shall be the largest and best equipped pump manufacturing plant in the world.

"There has been purchased during the past year the Clayton Air Compressor Works, which has proven an important acquisition to the properties of the company. The outstanding 40 percent of stock of the Holly company, except a small number of shares, has also been acquired in the process of reorganizing the affairs of the company."

Pneumatic Tool Litigation.

The Chicago Pneumatic Tool Co., a New Jersey corporation, having its principal place of business in Chicago, and Henry A. Pike and J. Walker Cregar, of Philadelphia, have been sued in the United States Circuit Court, Eastern District of Pennsylvania, by the Philadelphia Pneumatic Tool Co., of Philadelphia, through E. Hayward Fairbanks, Esq., for infringement of three patents owned by the latter company, viz., design for a casing for fluid-pressure-operated tools, pneumatic tools, and pneumatic rammers. The suits promise to develop some very interesting patent litigation, as the Chicago Pneumatic Tool Co. has heretofore claimed ownership by patent of almost every novelty in pneumatic tool invention. An adverse decision was rendered, however, in the suit it brought against the Philadelphia Co. for alleged infringement of a pneumatic hammer patent. The Cleveland Pneumatic Tool Co., of Cleveland, has also recently, through its attorney, Wm. Secher, Esq., defeated the Chicago company's inventor in interference proceedings in the patent office on a long-stroke hammer or hand-riveter invention. The Cleveland company is also in litigation with John F. Clement and Samuel Oldham and John J. Padbury, of Philadelphia, and with Clarence W. Peck connected with the Rand Drill Co., the suits involving a long-stroke hammer or hand-riveter invention.

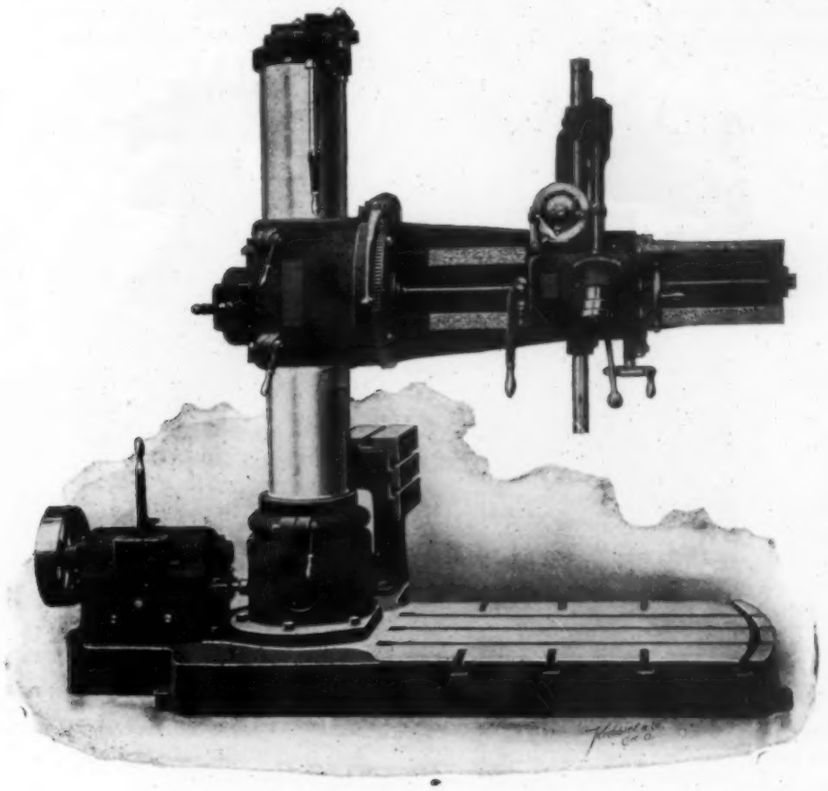
The offer of Drake, Bartow & Co., of Cleveland, of $100,000 for the Roanoke Iron Co.'s furnace and $25,000 for the Roanoke Rolling Mill, both of which are idle and in the hands of receivers, has been declined by the creditors of C. R. Baird & Co., of Philadelphia. The Cleveland firm announces that negotiations are ended so far as it is concerned.

NEW UNIVERSAL RADIAL DRILL.

The Bickford Drill & Tool Co., Cincinnati, has recently marketed a new universal radial drill which possesses an unusual number of novel features. Chief among these is the speed box which marks a new era in the abandonment of cone pulleys for obtaining different speeds and substituting plain pulleys with a nest of gears with clutches and levers for throwing the different combinations into action. Aside from the quickness with which the speed changes can be made is the advantage of having the belt run at full speed when drilling in heavy work—thereby eliminating the defect often found in cone pulleys of having the speed slow down. Not the least of its advantages is adaptability to constant speed motors.

In addition to a corresponding nest of gears with suitable levers and clutches in the feeding mechanism, the following are the leading features of the machine: A gage for reading all depths from zero, a multiple automatic trip which operates at one setting, at as many different depths as there are holes to be drilled, an absolute safety stop and a tapping device that operates at all speeds.

The accompanying illustration shows the machine complete.



NEW UNIVERSAL RADIAL DRILL.

The driving pulley, gear box and clutch lever will be seen at the left of the base near the column. The back gears are mounted in a box bolted to the back of the cuff, or sleeve of the arm and are operated through friction clutches and can be engaged or disengaged instantly without stopping the machine. The levers which operate the back gears are shown at the extreme left of the arm. An engraved index plate on the arms enables the operator to see at a glance the proper speed for drilling in either cast iron or steel. The speed box gives 16 spindle speed when operated in connection with the back gears, which are arranged in geometrical progression from 16 to 267 revolutions per minute. The back gear shaft transmits to the head and through a simple train of gears to the drill spindle.

The feed gear box is mounted on the head immediately to the left of the drill spindle, and contains a nest of gears that affords a choice of eight feeds, ranging in geometrical progression from .007 to .064 inches per revolution. An engraved plate on the front of the feed box indicates the position of the lever for the eight feeds.

Perhaps the most novel feature of the machine is the zero depth gage and multiple automatic trip. This tripping mechanism operates at as many as 12 different depths at one setting of the work. The depth gage is also provided with a safety stop permanently secured in the face of the tripping gear, which, when the spindle reaches the end of its traverse, engages positively with the trip lever, thus disengaging the feed, making it impossible to be continued, or the clutch to be thrown in again, until the spindle has been raised.

The arm has an internal locking device which exerts an outward pressure against the ways and practically forms a pipe section to resist the combined stresses of twisting and bending. The base is provided with a circular arc slot from which the end of the arm can be supported when the drill is operating under exceptionally severe conditions. This universal drill unlike those of other designs has the tapping attachment on the head and the hand-wheel for operating the latter is on the head itself immediately in front of the tapping lever. The illustration shows the smallest size, having a total vertical feed of 15 inches and will pull a 4-inch twist drill through solid cast iron under a feed of .012 inch per revolution.

Three sizes and four styles of this machine are now being built from designs and patents of Mr. H. M. Norris, the Bickford Co.'s works manager. The three sizes drill to the center of 8, 10 and 12-foot circles respectively.

The Standard Roller Bearing Co., of Philadelphia, has purchased a large and valuable piece of trackage property near the center of the city on the main line of the Pennsylvania Railroad, and will build a large factory for the manufacture of roll bearings. The new plant is intended to be a model one in every respect. It will be 200 feet long and from 100 to 150 feet wide. The principal buildings will consist of two factories 200 feet long and 60 feet wide, of improved design and construction, in addition to office buildings. It is the intention of the Standard Roller Bearing Co. eventually to build still further, covering the entire property of about 2½ acres. The Ball Bearing Co., also of Philadelphia, recently removed from Boston, will occupy a portion of the new plant, which will be specially arranged to meet its needs. The growth of the Standard Roller Bearing Co. has been noteworthy. Its products include ball, roller and all kinds of antifriction bearings of high grade for machine construction.

NEW PRATT & WHITNEY TOOLMAKERS' LATHE.

A 10-inch by 5-foot toolmaker's engine lathe has recently been designed and built by the Pratt & Whitney Co., Hartford, Conn. The machine has been constructed with all the attention to matters of precision characteristic of the work of this company and will serve for all shop purposes where accuracy and convenience are essential. Fig. 1 shows a front view of the machine and Figs. 2 and 3 are end and rear views, respectively. The head spindle is made of selected crucible steel is ground and runs in carefully aligned and hand scraped babbitt metal bearings cast solid into the heads and caps.

The spindle is hollow through its entire length and furnished with a draw-back mechanism having hardened and ground collets for rod work up to 5/8-inch in diameter, and step chucks with closers for holding short pieces of larger diameters. The end of the head spindle to which face plates are attached is threaded part of its length and the remainder left conical. The usual flange is thus avoided, the spindle overhangs less from its bearings and chucks may be held close to the head. The conical end is hardened and ground and holds the work true.

The head and tail-stock are fitted to two Vs in the usual way, but the Vs are somewhat smaller and lower than the V for carriage, thus permitting to the latter a deep and strong cross bridge. When the tail-stock is clamped to position it firmly ties the bed, giving additional rigidity. The form of bearing for the head and tail-stock is shown by the sectional view through the carriage, in Fig. 4.

The bed is cast in one piece with the pan, of such depth, rigidity and form as to maintain the truth of the lathe. The carriage is of the rise and fall type, but in place of the usual weight a coiled spring is provided for keeping tension on the upper part, thus avoiding the troublesome vibration of the carriage caused by the inertia and momentum of a moving weight. This construction gives a sensitive carriage, increases the length of cross feed and permits the bed to be cross girted. The carriage is gibbed to the bed, has broad self-oiling bearings, is guided by a wide and generous V at front and has a flat track at the rear. A very important reason for guiding the carriage by a singe V instead of two is based on the experience of the company that a long narrow bearing is much better for resisting twisting strains, when provision for longitudinal movement must also be made, than is a wide bearing of equal length. It is certainly true that the two Vs, when slightly worn, and sometimes when new, under cutting strains do not fit on both sides of each V, but are apt to fit on the outer side of each. In the single V and flat track construction this possibility is removed.

For turning, the carriage has a splined shaft feed, driven by a belt from a three-step cone, and is provided with an adjustable knock-off, which will be much appreciated by the workman. The feed worm runs in oil and the rack and pinion are cut from steel. The lead screw is large in diameter and is used for cutting threads only. In order to obtain extreme accuracy a special machine has been built for milling the thread of the lead screw. The carriage, head and tail-stock are hand scraped to fit the bed.

The taper turning attachment is very simple, with few working parts, and has the clamping and adjusting mechanism so located as to be readily manipulated by the operator from the front of the lathe. The base on which the taper bar swivels is graduated on one end in degrees and fractional parts and on the other end in inches per foot. Minute adjustment may be obtained by screws. The base is attached directly to the bed, may be located at any desired position between head and end of bed, and is practically solid when clamped. There is but one working joint and this is provided with taper gib to take up wear, so that all lost motion is avoided. This construction results in a stiff and accurate taper attachment.

The dimensions and capacities are:

Swing over bed, 10¾ inches.

Swing over carriage, 4 13-16 inches.

Length of bed on shears, 60 inches.

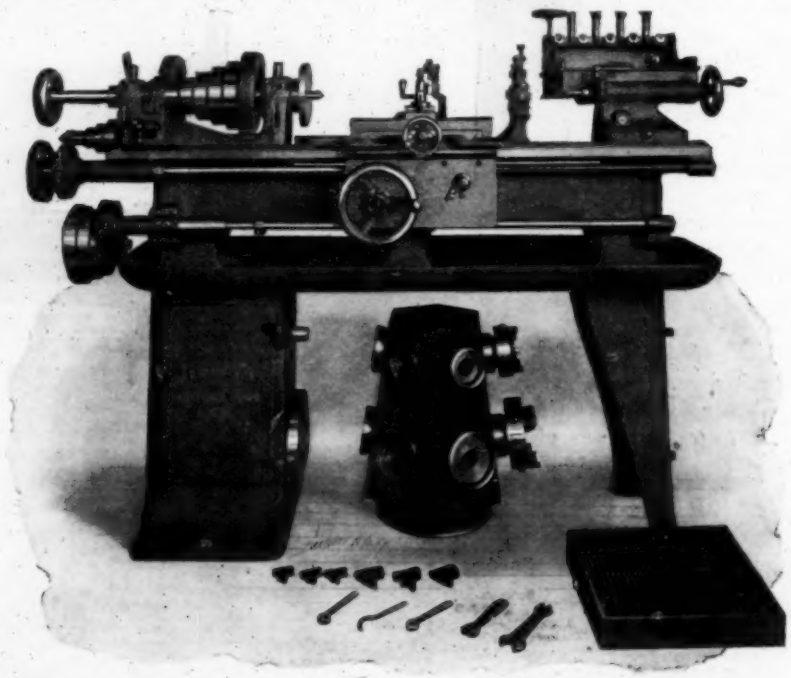


FIG. 1.—FRONT VIEW OF THE NEW 10-INCH X 6-FOOT TOOLMAKERS' LATHE.

Greatest distance between centers, 29 inches.

Will cut with English lead screw from 1½ to 156 threads per inch, including 11½.

Will cut standard metric threads with English lead screw from 13 mm. to 0.25 mm. pitch, including 0.75 mm. and 0.90 mm. pitch.

Will cut standard metric threads with metric lead screw from 20 mm. to 0.50 mm. pitch, including 0.75 mm. and 0.90 mm. pitch.

Will cut from 1½ to 39 threads per inch, with metric lead screw, including 11½.

Diameter of hole through spindle, 15-16 inch.

Largest diameter of stock draw-back collet will take, 5/8 inch.

Countershaft friction pulleys are 8 inches in diameter by 2¾ inches face.

Revolutions of countershaft per minute, 150.

Floor space, 77x31 inches.

Net weight with countershaft and attachments complete, 1,430 pounds.

Weight crated for domestic shipment, 1,630 pounds.

Weight boxed for export, 1,975 pounds.

Cubic dimensions of boxes, 70 feet.

Each lathe is furnished complete with the following appliances: One live center collet and center; nine draw-back collets, hardened and ground, to take round stock 1/8 to 5/8 inch, advancing by sixteenths; one stationary rest; one follow rest;

one large face plate; one small face plate; twenty-three change gears; one taper attachment; one countershaft with friction clutch pulleys, and three wrenches. In addition to these appliances a selection may be made from the list of toolmakers' equipment carried by the Pratt & Whitney Co.

STEEL CASTINGS AND THEIR TREATMENT.

BY W. M. CARR.

The art of producing steel castings may be divided into three heads: 1, the making or refining of the metal; 2, the preparation of the molds and the casting therein of the metal; 3, the final treatment of the finished casting. In ordinary practice the operations under the first and second heads receive the best care and attention in the hands of the manipulators so

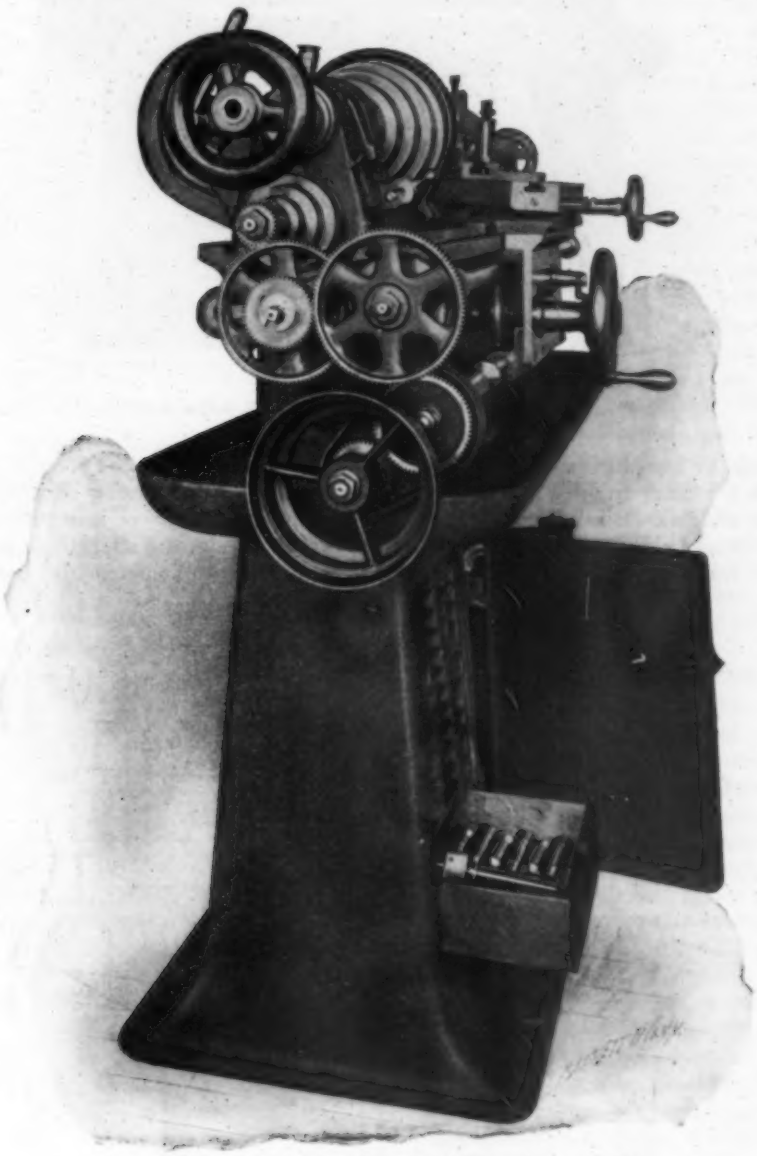


FIG. 2.—END VIEW OF THE NEW TOOLMAKERS' LATHE.

that the casting shall be of a given composition and of a solidity and trueness to pattern which those concerned consider about all that can be expected. The final treatment of the finished casting, it is to be regretted, is often ignored, or when observed much misunderstood by many manufacturers.

By the third step is meant a certain form of heat treatment usually termed annealing. Even though the first and second steps be conducted skillfully, the good work accomplished can be destroyed by failure to anneal properly or by not annealing at all. Let a steel casting be sent out by any manufacturer without due observance of a suitable heat treatment, he yet has no assurance that in regard to its physical properties or its ability to meet the requirements expected of it in service, it is in the best condition to give satisfaction.

A large percentage of failures due to brittleness can be readily traced to a definite cause. Brittleness is always accompanied by a large coarsely crystalline structure when normal in composition. Such a structure is purely the result of a thermal condition at some stage of the manufacture. When a steel casting is desired for any purpose there always goes with it a thought of stability, of strength, endurance—a resistance to wear not known to the same degree in a gray iron casting. Yet how often do steel castings fall short of such an ideal condition. To be ideal the casting should be solid. The metal should be of sufficient toughness to withstand shock. In other words it should possess the maximum degree of strength combined with the maximum degree of ductility. It need not be considered a rule that as the strength increases the ductility will decrease, at least in dealing with commercial cast steel.

In a great measure the composition and mode of manufacture will determine the ultimate strength, but the maximum ductility or toughness will depend upon the final heat treatment. An attempt to combine the ideal qualities and ignoring or imperfectly conducting the heat treatment will produce a metal which will be nothing other than a low grade cast iron. Pot-metal would better express it, when it is possible easily to snap a hard, unannealed casting by a blow from a hand hammer. Failing to secure such qualities the maker has turned to softness resulting in a low composition chemically. The aim was to confer ductility, but sight was lost of the prime feature of a steel casting, *i. e.*, strength. A casting so made may machine easily but its wearing properties will be little better than those of its half-brother, wrought iron. A coupon cut from such a casting unannealed may show considerable elongation and contraction of area, but this is no argument against annealing any or all steel castings, though such evidence of ductility is often so used. It is true soft castings are frequently unannealed, but the writer contends that if

softness or ductility is desirable, the maximum percentages of elongation and contraction of area, indices of ductility in any case, can only be gained by careful heat treatment. The fact of castings failing after annealing when used as an argument against such treatment will not hold in the light of advanced methods of heat treatment when aided by pyrometry and microscopy.

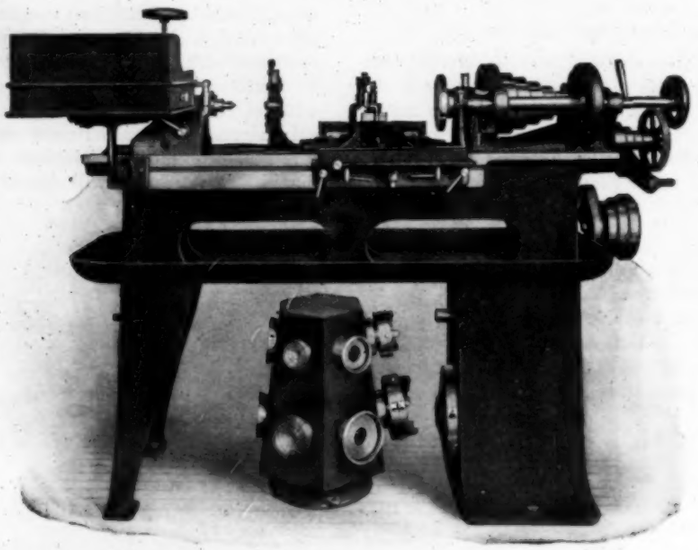


FIG. 3.—REAR VIEW OF THE NEW TOOLMAKERS' LATHE.

In many cases failures can be traced to improper treatment in annealing. Hence such a process requires some study, as does the art of melting or molding. It may be said that the three steps as previously outlined are one as important as the other, to combine the best results in a finished steel casting; consequently those who oppose annealing had better be sure of their ground in discussions of the question.

Let a case of failure in the steel casting be analyzed. It is assumed that the casting is returned broken after a comparatively short time in service. The fracture gives no evidence of blow-holes. It is a clean break; that is, has the characteristic metallic color in the absence of scale or oxidation (not rust). Then the failure is plainly not due to a hot or shrinkage crack. The next step, then, is to make a chemical examination of borings taken near the point of fracture. The subsequent analysis shows nothing in excess which might cause brittleness; that is, the metalloids are within established limits. No light so far—an example of the limitation of a chemical analysis. Let the examination of a fracture be carried on a little more closely. The grain of the metal to the eye is large and glassy. The casting is not disturbed, hence the metal is brittle and must have been subjected to either a steady pull beyond its ultimate strength or has been given a heavy blow. Such evidence points to the lack of proper heat treatment,

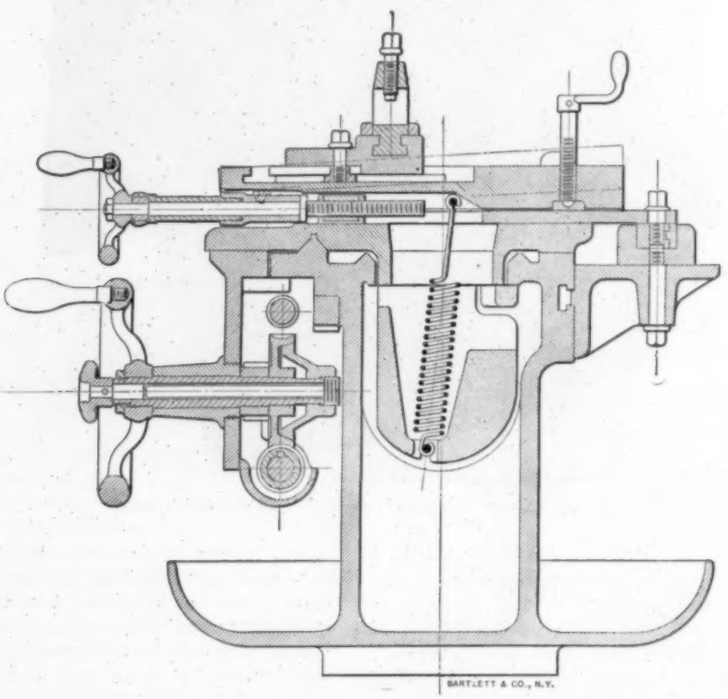


FIG. 4.—DIAGRAM SHOWING CROSS SECTION OF BED THROUGH THE CENTER OF CARRIAGE.

and a subsequent microscopical examination of the fracture as described will show how the metal was treated after casting; whether not annealed or improperly annealed. The remedy in such a case, or rather the prevention of a recurrence, necessarily entails a study of the distinct relations between the physical properties, structure and heat treatment.

The theory of a growth in the crystalline structure of a steel

casting caused by continued vibration leading up to a rupture does not hold, since it is now known that the size and arrangement of the crystals is purely a function of temperature and rate of cooling between the melting point of steel and its critical range—a range several hundred degrees above atmospheric temperature.

As a rule steel castings are made from open-hearth metal, some preferring the acid steel to the basic. However, first class castings can be made by the basic process as readily as by the acid. The point is this: It cannot be said that one rule of practice will apply to all. Some acid steel makers claim annealing is not necessary. The same argument is advanced by the users of basic steel. But to produce first class castings of any variety made by any process, first establish a composition calculated to meet the requirements or purpose of the purchaser. Then as a protection to him, as a bulwark to the growth, reputation, future and establishment of the steel casting industry, study the heat treatment in conjunction with the preliminary stages of manufacture. Then the finished casting made by such methods will be in the best possible physical condition when leaving the hands of the manufacturer. Otherwise the making of steel castings is but a leap in the dark.

In conclusion a tabulation of physical tests of castings made in every-day operations is herewith embodied. Attention is called to the high tensile strength and the high percentages of the elongation and reduction of area in annealed specimens, an unusual feature in unforged steel. There is also given the Standard Specifications for steel castings as adopted by the American Section of the International Association for Testing Materials.

STANDARD SPECIFICATIONS FOR STEEL CASTINGS.

Adopted by the American Section of the International Association for Testing Materials.

	Tensile Strength	Elongation %	Reduction of Area, %
Hard Castings	85,000	15	20
Medium "	70,0 0	18	25
Soft "	60 000	22	30

STEEL FOR CASTINGS.

C., 0.27, Mn., 0.85, Si., 0.35, S., 0.020, Phos., 0.025

Physical Tests.

Tensile Strength	Elongation, %	Reduction of Area, %	
84645	11.7	12.2	Raw.
71230	15.6	13.3	
88126	19.5	23.1	
77540	6.25	....	Annealed.
92465	24.2	38.3	
78506	27.4	32.5	
69595	32.0	42.2	
74503	25.0	48.8	Improperly Annealed.
71830	11.0	14.6	
66803	10.9	11.4	
86340	18 8	22.0	
92714	18.7	13.4	

As a knowledge of heat treatment grows there will be a corresponding increase in the percentages of elongation and reduction of area over those given in the present standard specifications.

East St. Louis, Ill., June 25.

The entire output of the Vulcanus Forging Co., Cleveland, is sold up to the first of the year. The company has been pushed for material for some time. A few days ago, the plant was shut down two days on account of not having rivet material. Last week the company received a carload of open-hearth billets, a carload of steel driver axles, and six carloads of open-hearth rivet steel.

At the conference held last week in New York, between the Amalgamated Association and officials of the American Tin Plate Co., the footnotes which were under consideration were not agreed to by the company. The changes desired in the notes were referred to the various tin plate lodges and until an answer is received from them the footnotes cannot be adjusted.

Through accident, a valuable find of iron ore has been made at the Tilden mine, near Bessemer, Mich., which will add a new lease of life to the property. A vertical shaft is to be put down and drifts made to test the extent of the ore deposit, which is believed to be very large.

American Plate Mills.*

At Pencoyd the writer found that the dampers of the steel furnaces were operated by electric motors; the air and gas valves were worked by hydraulics, and so arranged as to prevent any waste of gas at the period of reversing. The furnaces were fed by two Wellman electric charging machines, which saved eight men per shift per furnace, and increased the output by one charge per week. Running over the charging machines was a 25-ton three-motor electric traveling crane, built by the Brown Hoisting Machinery Co. The roof over this melting shop was a splendid job, well designed, and braced in every direction. For every two furnaces was one circular casting pit, holding two rows of molds, fed by a center crane. The ingots were taken on bogies to the soaking pits. The soakers were gas regenerative vertical furnaces, each holding 32 ingots, basic bottom; the slag from them contained 65 percent of iron. Another item worthy of attention was the dogs used at the soaking pits. These were opened and closed without an additional man, as is usual here. The bits in the dogs were made reversible. Their last gas producers were constructed with shells 11 feet or 12 feet diameter, water sealed, and gasified some 2,000 pounds of coal per hour.

The section mill had a 22-inch two-high roughing, and a 22-inch three-high finishing train, each stand of rolls driven by a separate reversing engine. They had rolled that day 8x8-inch angles, 10-inch joists, and 4x4-inch billets, to a total of 330 tons. Angles were rolled to 190 feet long, beams to 100 feet. The mill was equipped with electrically driven roller tables; a 40-ton overhead crane for changing rolls and standards; three regenerative gas reheating furnaces; and two electric charging machines. This mill was put to work in 1894, when it replaced the mill built in 1884, which was a three-high 20-inch mill, and turned out 500 tons per week.

The steam pressure was 120 pounds in the mill. The slabbing mill was driven by a reversing engine made by the Southwark Foundry & Machine Co., with a hollow crank shaft. The skid gear was very simple and quick, and simply consisted of two frames, each with three prongs on, which worked either up or down, or across the mill, by means of hydraulic cylinders.

The Lukens Plate Mills.

At the Lukens Works, Coatesville, near Philadelphia, a very fine new three-high universal plate mill, capable of rolling plates from 9 inches to 48 inches wide, and over 100 feet long, has top and bottom rolls 28 inches diameter by 87 inches long, the middle roll 20 inches diameter by 87 inches long, the vertical rolls being 18 inches diameter, all of chilled cast iron. The pinions are 27 inches diameter, with staggered teeth. The weight of the mill is over 300 tons, and it is 29 feet extreme height. The engine is tandem compound condensing, with cylinders 34 inches diameter high, 60 inches low, and 60 inches stroke. Each cylinder is fitted with two sets of piston valves, the steam valves being actuated by variable eccentric cutoff gear. The engine is direct coupled to the mill without any reduction gearing. Live roller gear, lifting and falling tables about 30 feet long, are fitted at each side of the mill; the lifting being done by hydraulic power, and the rollers being driven by enclosed reversing motors.

The steel plant embraces six large Siemens three-port, 50-ton furnaces, making 10 to 11 heats per week of 60 tons. These furnaces have very large regenerators, which are placed away from the furnaces under the charging platform, and thus the risk of being choked up is greatly reduced. The regenerators are well built, and strongly bound by steel girder work. The furnaces are charged by Wellman electric charging machines.

The ladles are handled by two powerful electric cranes of 75 tons each, and they are fitted with an auxiliary hoist for tilting the ladles. There are two main winding drums, the wire ropes of which straddle the main girders. This method prevents undue swinging of the ladle should the crane suddenly be brought to rest. The ladle cranes were built by the Morgan Engineering Co. In addition to these cranes, there are also three 10-ton cranes.

Ingots for the new universal mill are heated in four hori-

* Abstract of paper read by Henry Crowe, of West Hartlepool, England, before the Cleveland Institution of Engineers.

zontal gas regenerator furnaces, arranged in two rows of two each. The charging machine is ingenious, and runs the full length of the building on girders about 75-foot centers. The ingot is gripped endways on, lifted up or down, always maintaining a horizontal position. The trolley is suspended from the crane girders. All these various operations, traveling, cross-traveling, revolving, lifting, gripping, are performed by the one operator. This machine is designed to handle an ingot up to 6 tons.

The slabbing mill is of the universal type, with rolls 34 inches diameter by 108 inches long, and driven by a reversing engine with cylinders 46 inches by 50 inches stroke, made by Mackintosh, Hemphill & Co., Pittsburg. The vertical rolls are driven by a separate reversing engine, with cylinders 28 inches diameter by 30 inches. The driving gear of these rolls consists of an ingenious arrangement of double worm gear, running in an oil bath, and carefully protected from the heat. The main driving spindles are 20 feet long, fitted with a universal joint, patented by the designer of the mill, Julian Kennedy, of Pittsburg. The main pinions and all the gearing are made from steel castings, annealed, machine cut teeth, and oil tempered. This mill will produce slabs 54 inches wide by 24 inches thick, and also 4-inch, 6-inch, 8-inch and 14-inch billets. The hydraulic shears will cut hot slabs 24 inches thick by 48 inches wide. Water tube boilers, working at 150 pounds steam pressure, and fed by mechanical stokers made by the Roney Mechanical Stoker Co., supply steam to the mills, etc. Two sets of electric generators, each 150 kilowatts, supply electricity at 250 volts for the motors. All the furnace doors are lifted by pneumatic power. The plate on leaving the mill, passes on by roller gear to the side straightening bed, which presses the plate, by means of a series of screws, against a planed metal edge. On the cooling chains being lifted by hydraulic power, the plate slowly travels to the roller tracks, which convey it to a fine pair of shears driven by 60-h. p. motor, where it is cut to the desired lengths. Rollers again convey the plate under an overhead crane fitted with two trolleys, each trolley capable of lifting 3 tons, on to the loading dock. The whole mill is under a substantial steel structure, fitted with an overhead electric crane.

Plate Mills of Worth Brothers.

At the works of Worth Brothers, Coatesville, there are six 3-port Siemens steel furnaces, the charging doors of which are all worked by hydraulic power. One circular casting pit serves two furnaces. The latest mill erected at these works is a fine three-high plate mill, having top and bottom rolls 132 inches wide by 36 inches diameter, provision being made in the standards to take rolls 40 inches diameter. The middle roll is 22 inches diameter with a lift of 24 inches. The engine is a fine Corliss one, cylinder 42 inches diameter by 60 inches stroke, made by Robt. Wetherill & Co., Chester, Pa., and supplied with steam at 120 pounds pressure by 10 boilers, fitted with automatic stokers. The middle pinion to which the engine is coupled makes 78 to 80 revolutions per minute, and the top and bottom pinions are larger, so that the rolls run about 45 revolutions per minute. As these rolls are very heavy, only the middle roll is taken out once a week and dressed up to suit the hollowness of the big top and the bottom rolls, these being dressed every eight weeks. The lower roll is, of course, fixed, the top roll balanced, and the middle roll is worked up or down by hydraulics, until it is in contact with the upper or lower rolls, as is desired.

The mill will take ingots 24 inches thick, and deal with them up to 12 tons weight. About four minutes is the time occupied for rolling one plate. The finished plate travels slowly down the roller track, then back towards the mill, then on again towards the transfer gear, which also turns the plate over if desired. This apparatus consists of two sets of double arms, worked by two hydraulic single-acting cylinders. Along the full length of the arm is fitted spur wheels, which act as live rollers. As these are shrouded up to the top of the teeth, they are connected by intermediate wheels, which are kept below the edge of the arm. The left hand arm is tilted, thus tilting the plate up on its edge and up against the right hand arm, which is lowered. In fact the plate is turned over by a huge pair of tongs. After this operation, it is run along more roller gear entering the back of the shears. Here it is cut by shears made by H. Aitken, the blade being depressed by a pair of hydraulic cylinders, acting on wedges. Two small cylinders, one at each end of the apron, lift the blade. The hydraulic pressure used is 500 pounds, and the shears are capable of cutting 1½ inches thick, and 12 feet long. The front of the shears is fitted with castors placed about 1 foot 9 inches center. These are on 2-inch stalks and have rollers 6 inches diameter by 1½ inches thick.

The Duquesne Billet Mills.

At the Duquesne billet mill, which does about 1,000 tons per shift, ingots about 18 inches square are bloomed in a two-high reversing mill with 38-inch rolls; the screws are quickly fed down by hydraulic cylinders and multiplying gear at each pass. The engine, which is direct coupled to the mill, makes 80 revolutions per minute, so that the ingot is rapidly brought down to about 8 inches square, when it passes along roller gear to the shears, has its front end cropped off, then cut into three lengths, and the last one cropped off. The crops are rapidly taken away by a conveyor elevated in trucks, with a copious supply of water poured into the truck. The first piece is instantly put into the roughing mill; when it has received two passes the second piece is put to follow, so that here again both pieces are in the rolls at the same time. The roughing consists of three stands of rolls; two are three-high, and one is two-high. Here again the method of getting the pieces from the top grooves to the bottom grooves, and turning them over, is most simple and ingenious, being done by troughs, which, as they are lowered, turn one-quarter of a revolution. In the three sets of rolls there are again two sets of three-high and one set of one-high, the latter for flats. In the fourth set of rolls there are two sets of three-high and one set two-high, the two-high finishing the flats. As the small billets are leaving the finishing rolls they are cut into proper lengths, while being rolled, by an ingenious pair of flying shears; a stop, which regulates the length of the billet, putting the blade in action. The moving billet actually works the blades. I saw billets, flats, and angles all coming out of the mill at the same time. I need hardly tell you I would have liked to have watched the mill working a few days, instead of walking past it. When the flats leave the finishing mill they come to a spring stop; when about 20 to 30 are piled up, a hydraulic cylinder lifts them up on to selfacting catches, thus making room again for the next lot.

Homestead Universal Cogging Mill.

This mill deals with ingots 53 inches wide by 24 inches thick, 25,000 pounds weight, and cogs about 350 to 400 tons per shift. The main rolls are 32 inches diameter, driven by a two-cylinder reversing engine, with cylinders 46 inches by 60 inches stroke, developing up to 6,000 horsepower; while the vertical rolls are 20 inches diameter, driven by a separate 28x48-inch reversing engine. Hydraulic manipulators are fitted on the front side, and the cogging live roller gear extends about 40 feet each side of the mill. The engines were built by the E. P. Allis Co., of Milwaukee. The slabs are cut by hydraulic shears cutting up to 48 inches wide.

The three-high plate mill has rolls 128 inches long; the top and bottom rolls only are driven direct coupled to an automatic cutoff engine with 46 inches diameter cylinder by 60 inches stroke, and runs about 78 revolutions per minute. Lifting live roller gear tables are fitted each side of the mill, the rollers being about 12 inches diameter and nearly touching each other. After the plate has been rolled it is passed through straightening rolls, made by the Philadelphia Roll Straightening Machine Co.. This machine has four top and five bottom rollers, all 12 inches diameter, and made of forged steel. Roller gear about 210 feet long brings the straightened plate to the shears, which were built by the Morgan Engineering Co. There is also a machine for cutting circular plates, built by R. S. Newbold & Son, Norristown, Pa. For handling the plate in front of the shears about 20 feet of castors are fitted. The shearing shed for the mill is about 80 feet wide by 200 feet long and contains three pairs of shears, arranged in such positions that the sides of the plate can be sheared without having to turn the plate around. The mill seemed to be turning out about 200 tons per shift, the tests being about

58,000 pounds tensile, 30 percent elongation, and 50 percent contraction. Basic open-hearth steel.

Illinois Steel Works.

Here the steel plant embraces six fixed Siemens furnaces, and four Wellman tipping furnaces, each with five doors, water cooled. In charging liquid metal, they add about 10 tons to a 20-ton charge of cold material.

The 40-inch cogging mill is an extremely fine one, and is capable of rapidly bringing down ingots into slabs for the plate mills, billets and blooms. The ingots, which are cast on cars, are stripped in the stripping house, and run directly to the re-heating furnace building, which contains six gas-fired regenerative soaking pits, where they are charged by two overhead charging and drawing cranes of 15 tons capacity. The ingot being heated is drawn and placed on the ingot tilter. About 120 feet of live roller gear brings the ingot to the cogging mill, having rolls 84 inches long by 32 inches diameter, driven by a pair of reversing engines, made by the William Tod Co., with cylinders 46 inches diameter by 60 inches stroke, with piston valves actuated by Stephenson's link motion. A helical pinion on the engine shaft gears into the second motion shaft, the ratio being about 1 to 1¾. The top roll has a 36-inch vertical lift and is counterbalanced by two hydraulic cylinders under constant pressure. The screw down gear is hydraulic, with multiplying motion, and is very quick. The vertical rolls for edging are about 20 inches diameter, direct coupled to a pair of reversing engines with cylinders 26 inches diameter by 30 inches stroke. The side screws are operated by an electric motor. Roller gear tables about 40 feet long each side are driven by a 12x12-inch reversing engine. Hydraulic tilting gear is fitted on the delivery side. After the slab has left the cogging roller gear tables, it is carried along a roller track about 60 to 80 feet long, worked by an electric motor, to the hydraulic shears, which have a stroke of 28 inches and will cut up to 50 inches wide. Three hydraulic cylinders actuate the shears, and the valves are so arranged as to bring one, two or all three cylinders into operation. Thus the shears are fairly economical.

When cogging small billets, etc., the material passes clean through the large shears, when it is conveyed by electrically-driven roller gear to another hydraulic shears, which is specially made for dealing with this material. This mill is provided with all the usual auxiliaries; the compound duplex hydraulic pumps delivering at 750 pounds pressure being in duplicate, each of ample power. The boiler feed pumps are also in duplicate.

The main building is about 70 feet span with crane girders the whole length. In addition to the two electric charging cranes is one 30-ton electric crane for changing rolls and another 15-ton high speed crane. The mill will cog blooms 24 inches by 24 inches, slabs 2 inches to 10 inches thick, and from 14 inches to 38 inches wide. The estimated yearly output of this mill is 200,000 to 250,000 tons.

South Chicago Plate Mills.

Here four horizontal gas regenerator re-heating furnaces supply two mills driven by a Porter-Allen engine, 54 inches diameter cylinder by 66 inches stroke, which makes 60 revolutions per minute. As is usual with three-high mills, they are of the Lauth type, similar to those described for Worth Bros. The rolls next the engine are 34 inches diameter top and bottom, 18 inches diameter the middle one, all 90 inches long, of chilled iron. In the outer stand the rolls are the same diameter but 132 inches long. The rolls open 24 inches, and will roll ingots about 7 tons weight. After the plates are rolled they are passed along roller gear through straightening machines, then back again, when they are conveyed along the cooling beds to the roller gear, which passes them through the back of the shears. At right angles to these shears are placed two other pairs of shears for shearing the sides of the plates. In the shearing shed the plates are manipulated on castors; electric cranes lift the plates into trucks.

Homestead Plate Mills.

At the Homestead Works, one of the latest universal plate mills has six regenerative furnaces to feed it, each with four doors worked hydraulically. The furnaces are arranged in two rows of three each, so that the charging and drawing can be done independently. The slab-shaped ingots, up to 51 inches wide and 11 inches thick, are brought into the heating shop on narrow gauge bogies, where they are charged by a Wellman electric charger, similar to the well known steel furnace charges. In this heating department there is one man to each charging machine, one heater, and one helper to each three furnaces, and one boy to work all the valve levers for the hydraulic door lifting, or seven hands in all.

On entering this mill the first impression one gets is that it is off, as you can't find any men about. The furnaces are well built, and not a particle of flame leaks from the doors; in fact, you have to look carefully to see if they are on. The same machine which charges the ingots draws them, places them on a bogie, and they are then conveyed by electric power on to the live roller gear, which is about 180 feet long on the front side of the universal mill, with rolls about 30 inches diameter, and driven direct by a very powerful two-cylinder engine, whose cylinders are 54 inches diameter by 60 inches stroke, and fitted with piston valves. This splendid engine was built by Mackintosh, Hemphill & Co., Pittsburg. A driver handles the engine in the usual way, but it is the engineman, who does not drive, who has charge of the whole machinery. He does the oiling, and is continually going round seeing that all is right, and is paid a higher rate than the driver.

Steam at a pressure of 150 pounds is supplied by a range of 16 Cahall water tube boilers, 12 working and 4 spare ones, all fitted with chain grate stokers by the Aultman & Taylor Machinery Co., Mansfield. The coal requires no handling, being elevated in large storage bins above the boilers by elevators supplied by Heyl & Patterson. Below the boiler grates the ashpit slopes, and the ashes simply slide into trucks. Absence of manual labor is again prominent, there being only one water man, one coal man, and two ash handlers, or four in all.

After the plates are all rolled, roller gear about 220 feet long brings the plate to the far end of the side straightening bench. I need not describe this as it has already been described for the Lukens Mill. This mill possesses an important feature over the Lukens Mill owing to the straightening devices and cooling chains being in duplicate. Not only is this necessary to deal with the large output of the mill, but should a stoppage occur in this department, the mill is not altogether idle. Cooling chains convey the plates to the rollers, which in turn revolving slowly, convey the plate (it is here marked off into the required lengths) to the shears. Castors are provided to manipulate the plate instead of our bogies; it is then weighed and shipped into the truck. We might add here, that once the ingot leaves the re-heating furnace, it will not come to rest until it is in the railway truck in the form of plates.

Compound hydraulic pumps in duplicate supply the necessary power, having steam cylinders 22 inches and 36 inches by 36 inches stroke, the rams being 10 inches diameter. These were made by the Wilson-Snyder Mfg. Co., Pittsburg. This mill turns out 240 tons per shift, but on a suitable order can do 350 tons. Cleanliness is the order of the day here; the mill floor is all paved, not a bolt or washer lying about, and the roller gear shafting is kept bright.

The following are some particulars of work done in the Homestead 128-inch three-high plate mill, covering a period of one month:

Total number of working hours in month	594
Time lost in month	57
Actual working hours	537

Heats rolled—2,025.
Number of slabs (or plates) rolled—16,200.
Average time to roll each slab—1.99 minutes.
Plates sheared—80,675.
Average time to each—23.9 seconds.
Total tonnage produced—12,629 tons.

At the Homestead Works the total horsepower represented by motors installed is 12,000. The generators are of 3,500 horsepower, yet only 2,000 horsepower generally leaves the power house. This statement alone is sufficient proof of the economy of electrical transmission.

A great increase of boiler pressure has evidently taken place during the last ten years, as I found steam pressure to be generally 150 to 160 pounds per square inch. Water tube boilers seem to have replaced the cylindrical type.

The absence of labor in the American mills is so well known

that little can be added here. Coal elevated in storage bins above the boilers, and fed down in tubes to the mechanical stokers is the rule, and there are subways under the grates to receive the ashes without further handling.

The labor at the Homestead 48-inch mill is as follows:

BOILERS.

1 Water man. 1 Coal man. 2 Ash handlers.

HEATING SHOP.

2 Charging Machine Men.
2 Heaters for six Furnaces.
2 Helpers for six Furnaces.
1 Boy for Door Lifting.

MILL.

1 Engineer.
1 Engine Driver.
1 Overhead Crane Man.
1 Roller.
1 Screwer Down.
2 Guide Men.
1 Salter and Scaler.
2 Oilers.
2 Roller Gear Engine Men.

STRAIGHTENING AND SHEARING DEPARTMENT.

2 Straighteners.
1 Engineer, Drag out gear.
1 Oiler, Roller Gear.
2 Stampers.
2 Line Drawers.
2 Markers Off.
2 Shear Men.
12 Helpers.
2 Weighers.
2 Checkers.
1 Pumping Engine Man.
2 Overhead Crane Men.

Superior Mechanical Appliances.

Here we have a striking example of the absence of labor due to the excellence of the mechanical appliances of the American mills. From the ingots coming into the heating shop to the finished plates, there are about 54 men employed (this does not include the loaders up) all very well paid indeed, rollers getting 36s. per shift; heaters about 32s., down to the boys who work the door levers for 6s. per day. Yet the output of this mill averaging perhaps 225 tons per shift, the actual cost of labor is only about 3s. 6d. per ton.

With regard to the mill engines, the reversing engines are very fine indeed, and of ample power. If the Americans are behindhand at all, it is that they have not yet adopted the three-cylinder engine instead of the two-cylinder ones. There can be no doubt about the economy. It is capable of being started easily in any position of the cranks, worked expansively with its even turning moments, meaning that a less engine will do the same work with less liability to break rolls. Condensers are being rapidly fitted to most mill engines—Carnegies favoring the Weiss type. The screws of the housings are always worked by electricity or hydraulic power.

Perhaps the most noticeable difference from the English practice is the speed of the rolls, reduction gearing generally being conspicuous by its absence. Generally speaking, I should say the speeds are double ours. Having high pressures and powerful engines, they put a heavy draught on the piece, bringing it rapidly down while hot. With regard to their slabbing mill, their latest practice seems to be instead of turning the ingot, to edge it, which means both time lost by tilting and screwing up the rolls, to edge the piece by vertical rolls driven by a smaller and separate engine. The two operations are thus done simultaneously, saving time in addition to the time saved in not opening the main rolls.

With regard to the flywheel mill engines, these are all very fine types, all fitted with some economical appliance of some kind. Many are compound condensing fitted with Corliss or other automatic cut off valves. A common slide valve engine with an ordinary throttle is hard to find, and many of our English mills would be more economical if they purchased some of the second-hand engines which the Americans offer for sale. Horizontal furnaces with power worked doors for re-heating slabs are the rule.

Gas fired regenerative heating on the Siemens principle is universal. It might be said that the abundant supply of natural gas interferes with the adoption of the ordinary direct coal-fired furnace, but at the various works which are without the natural gas, gas regenerating furnaces are always adopted. Their advantages over the coal-fired furnaces are very numerous. I do not believe that the outputs of the American mills would be so great, or their mills run so smoothly if it were not for the regenerative furnace. The unequal heating of ingots in a coal-fired furnace is liable to cause the piece to come out anything but straight from the rolls.

With a reversing engine the mill can be stopped or eased down, but with a continuous running three-high rail mill I do not believe that such huge outputs could be accomplished with steel heated in coal-fired furnaces. Their other advantages are: No stoppage for cleaning grates, less labor, cleaner work, less coal consumption (even after deducting any allowance for steam raised from waste heat), less repairs, and not least—less waste of steel, and I think I might rightly add, less steam to roll the piece down.

The American mills are all about three feet higher up than our mills, so that the slabs or blooms have not to fall two or three feet from the furnace to the rolls. Another advantage is—all the roller gear is not underground, nor is the mill engine so low down. Machinery is thus more easily kept clean, and in good repair. All mill spindles are carefully balanced, resulting in smoother running, and less wear and tear on the roll wobblers.

Very careful records are kept of the performances of the mills, and, as has often been before said of the English mills, they are very often not properly fed. Careful records should always be kept of the time lost, under the various headings, as meals, oiling, breakdowns, steam, and shortness of steel, and the time lost between the finish of one piece and the start of the one following.

Many machines, such as charging machines and cranes, which were worked by hydraulic power in 1890, although good and useful machines, and performing work which is even now done by manual labor in this country, have nearly all been discarded, and replaced by electrically-operated machines, working more economically, and at higher speeds. Hydraulic power, although very useful, is by no means cheap—always pumped at the top cost for steam. Much of it is used in performing practically no work. Leakages are difficult often to locate when many return pressure pipes are coupled into one common return main. All return water would be better if emptied into an open funnel on the main return pipe; the leakage from any one valve could be easily detected.

Electric generators, giving 250 volts continuous current are the rule, with an inclination to fairly large units, driven by open vertical high class engines in duplicate sets.

The Americans go in for large outputs in order to get their costs down. In the plate mills they do in one stand of rolls what we do in two. In our plate mills, when rolling in the soft rolls, the hard rolls are going round doing nothing; when finishing in the hard the soft are doing nothing. This they could not stand; they would not be long in putting down another engine, and so greatly increase the output, without proportionately increasing the total cost. All the important plate mills are equipped with cold straightening machines. The mill seems to me to be the proper place for straightening plates instead of the bridge in ship yard.

The American works are newer than ours. When they put theirs down, they no doubt copied all the good things we had, and at the same time introduced as many improvements as possible. It is now time we did the same thing.

I have not touched on the difference of the British and American workman, as this would require a paper in itself. I might say, however, they all seemed to have their heart in their work. If any new machinery or process is about to be tried they all do their best to make it a success. The managers are not troubled with several union officials getting on their track to know what benefit the men will be likely to get out of it before the job is started.

That in America standardizing as much as possible is of the greatest value to them there is no doubt, as it leads to cheap production and quick delivery. When all our Great George St. engineers, together with manufacturers, agree on standard specifications for steel, on standard designs for bridges, etc., as far as possible, so much the better for England. What contractor is not frightened at the words in a specification "the consulting engineer"? Often the most difficult part of a manufacturer's estimate is to know what to put on for that gentleman's power, but this again is outside the scope of this paper.

SUGGESTED AT THE SHOP.

BY F. O. REMAN.

I have just received a clipping from the London *Ironmonger* announcing the death at Oswestry of Mr. James Whittaker, "who was well known in connection with the manufacture of mechanical tools, screws and bolts. He served his apprenticeship with Whitworth's, and subsequently he was with Collier & Co., of Salford. The deceased afterwards returned to Whitworth's works, where he introduced the slide-rest for lathes. He then became manager to Mr. Joseph Hulse, of Salford, and invented a machine for making setscrews with unbreakable heads." He was a man of parts and I take it that if there is any machinist to whom the mechanical world should owe a debt of gratitude it is the chap who introduced the slide rest into the leading English shop. The debt is all the greater, I guess, if we were lucky enough to get it soon after that event. The average machinist can do so many things with the slide rest that it is rather a strain to think how we should get along without it. We should be back to the hand tool and the rest of the things which were common in the early days of the craft.

* * * * *

There's lots of glory in the introduction of the slide rest in these world renowned works. The obituary does not say Mr. Whittaker invented the slide rest, but it is fair to take that for granted. Whitworth would not overlook the advantage of a device of that kind. No, indeed. He would have been among the first to welcome it or I have had a wrong impression of the eminent English engineer. I wish the item had given a few dates and a little more information about Mr. James Whittaker, lately deceased.

* * * * *

In one particular, the paragraph tells too much and is liable to strain that trans-Atlantic regard that has stood the pressure of the Boer war, the Venezuelan treaty, the Behring Straits difficulty, and a lot more of that ilk. How is it that the machine for making setscrews with unbreakable heads has been kept from us so long? This is not a square deal. It is not the proper caper to circulate such a tale in coronation times. Will it not be likely to lead to more heated argument than the question of dressing the representative of these United States for that occasion?

* * * * *

The mere idea of keeping from us the secret of producing a machine of this sort. Just imagine what a joy a machine of that kind would have been to us. Even a few boxes of these remarkable screws would have been a treasure of exceeding worth. With what speed the shop manager would have put them on his machines. He would not then fear the attack of the brawny armed son of Anak, or any other fellow, with an 18-inch wrench on a ⅜-inch setscrew. He would not wilt the width of a hair when the husky laborer used the one big monkey wrench on all sizes of setscrews, on everything from the shafting above to the feet of the machinery below.

* * * * *

Did you ever break off a setscrew in a pulley just when you were giving it the final yank? The last test before going down the ladder and washing up. Perhaps it might be late at night. The job had been a dirty and a tiring one, you were thinking of supper and a rest. Just then, at the "psychological moment," the head of that infernal setscrew gives way. The pulley may be exactly where you want it to be and of course the setscrew could not have a tighter grip. Most of the time, when anybody is around, the pulley will be on the move and that broken setscrew will not be noticed. You might not want to think of that and maybe you will get a chisel or a drill to work on the headless humbug and dig it out by hand. You may do this without injury to the hole tapped into the pulley, you may get another setscrew to take the place of the old one, etc. Oh, yes, you may not do any more damage, you may go right home as soon as the "psychological moment" took a hand in the game.

* * * * *

But you would not have had any worry of this sort with unbreakable setscrew heads. You could have had a grip on the screw which would have held like a shrink fit, ½ inch from the limit set by the drawing. Not a setscrew would have lost its head and many a toolholder today would be doing business at the old stand if they had had screw heads that could not be broken. Many another head would have rested better if the invention of the late Mr. Whittaker had been handy. Now if our cousins over the way will let us in on the ground floor we may try to overlook the unkind delay. We may be told why unbreakable setscrews are not more freely used in England. Perhaps they are limited to machines for home service and so long as the export trade did not know any better there may have been an excuse for that practice. We are more interested in tomorrow than yesterday and basing our wants on today's needs we will be content if we can get these setscrews as we require them and there's no kick coming on what we have missed.

* * * * *

Nevertheless I wish we had had more particulars about the Whittaker who introduced the slide rest at Whitworth's plant. Joseph Whitworth was born in 1803, started in to learn the trade from a firm of machinists, Crighton & Co., Manchester, in 1821 and in 1833 went into business for himself. I have been looking over the old copies of the *Mechanic's Magazine*, of London, and I find that under date of Dec. 20, 1824, a correspondent sent in an article on "A New Method of Fluting." This is illustrated in Vol. 3, and briefly it may be considered as performed by means of a slide rest tilted at an angle with the aid of a wedge of beechwood. The slide rest is operated by a screw and flutes may be cut at an angle on work held between the centers of a lathe. Evidently the slide rest had long before been a well known shop device. Some years at least before Whitworth cut loose for himself. It is not of so much consequence whether Mr. Whittaker invented the slide rest or merely introduced it into the Whitworth works but all will be forgiven when we are put in reach of these unbreakable screws. The "long felt want" is not in it for a second with the mechanic yearning for screw heads that are on for keeps. A setscrew with an irremovable head is vastly better than a wrench with a safety valve and on occasion is as good as a machinist with sufficient shop sense.

Contracts for the machinery and equipment of the new coke plant of the United States Steel Corporation to be erected in the Pocahontas coal field in West Virginia, have been let during the past two weeks. The General Electric Co., of New York, will have charge of the installation of all the electric equipment and the engines will be installed by the Harrisburg Foundry & Machine Co. The boiler plant will be installed by the Aultman-Taylor Co., Mansfield, O. Contracts have also been placed for the erection of 950 of the bee-hive ovens.

Returns for the six months just ended show the production of all classes of manufactured iron in the North of England District to have been the smallest recorded in the history of the trade. The total was only 41,900 tons, compared with 46,206 tons for the same period of 1901, which was the previous worst half year. Compared with 1899 this year's output shows a diminution of 51 percent.

The South Carolina Inter-State and West Indian Exposition, at Charleston, S. C., which closed May 31, gave the following awards, representing the highest in each class, to the American Steel & Wire Co.: Gold medals for merchant iron and steel and cold drawn steel shafting, horse and mule shoes, wire nails, rail bonds, wire rope, machinery and appliances for drawing wire, springs and spring wire, copper, iron and steel, aluminum wire; silver medals for bicycle and automobile spokes, rolled wagon skeins, underground and overhead wires and cables, metallurgy of zinc; bronze medals for music wire, coal and coke, bale ties, chemicals and colors; diploma of merit for the company's installation in Commerce Building.

A movement has been started by the St. Louis Manufacturers' Association to secure for that city the new tube plant which is to be erected by the National Tube Co. President Schwab of the steel corporation has been invited to visit St. Louis.

A SPECIAL AUTOMATIC CHUCK.

The firm of Bardons & Oliver, Cleveland, has built to the order of Hill, Clarke & Co. a turret lathe with special equipment for machining the handle of a pneumatic hammer handle. The work was awkward to hold as will be seen on examining the piece illustrated in Fig. 2. We are indebted for the following description to Hill, Clarke & Co.:

The extra capacity spindle end of the Bardons & Oliver turret lathes was designed specially for a class of work too large for standard collets, and which was formerly held in a lathe chuck, necessitating stopping the machine to chuck each piece of work, with a corresponding loss of time. This spindle end effects a great saving in time in chucking, and also, owing to the slight overhang, there is less tendency for the tools to chatter. The work that can be held is not limited, as may be seen, to circular pieces, but squares, hexagons and many irregular shapes, such as those here shown, can be held by the employment of suitable false jaws in the automatic chuck.

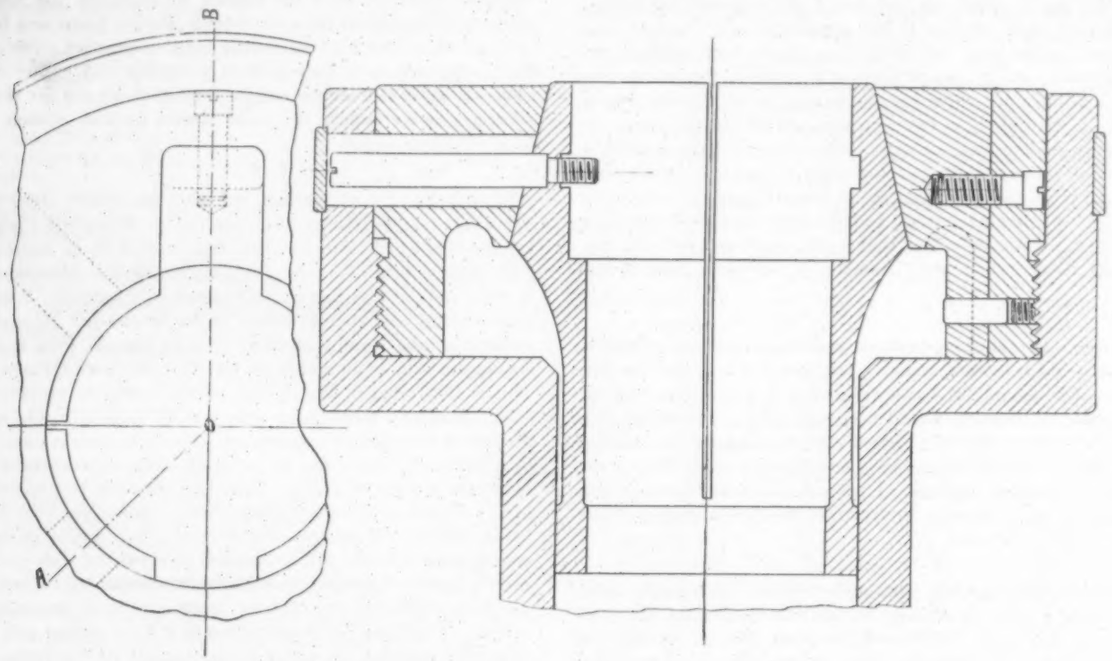


FIG. 1.—DETAILS OF AUTOMATIC CHUCK.

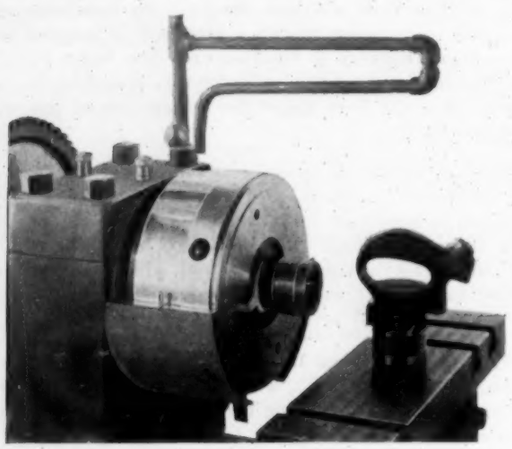


FIG. 2.—SHOWING THE IRREGULAR SHAPE OF THE HANDLE, TOGETHER WITH THE SPECIAL CHUCK.

The collet used for holding this pneumatic hammer handle is the No. 12 master collet with openings on both sides to allow the handle to pass. There are also corresponding openings in the collet ring. These openings in the collet do not interfere with its use for regular work, a filler being provided for the opening in the collet ring. The false jaws may be changed without removing the collet, and the ring around the head of the spindle slides so as to cover the screw holes when the machine is not in use.

The first illustration shows more fully the construction of this special automatic chuck.

Another example of work held in the extra capacity automatic chuck is shown in Fig. 3. The piece to be held is the valve bonnet at the right of the figure. At the left is the extra capacity master collet, and in the center the set of hexagon false jaws which adapt the collet to holding the work. The last illustration shows the valve bonnet in the machine with the outer end finished.

A movement is on foot to combine all the independent yards where steel vessels are built or repaired with the exception of the Davidson yard at Bay City, Mich. The plants which it is understood have arranged to enter the consolidation are the Craig Shipbuilding Co., of Toledo; Empire Shipbuilding Co., of Buffalo; Columbia Engineering Works, of Marine City; Burger & Burger, of Manitowoc; Jenks Shipbuilding Co., of Port Huron, and the Shipowners' Drydock Co., of Chicago. It is expected that all important plants not controlled by the American Shipbuilding Co. will be taken in.

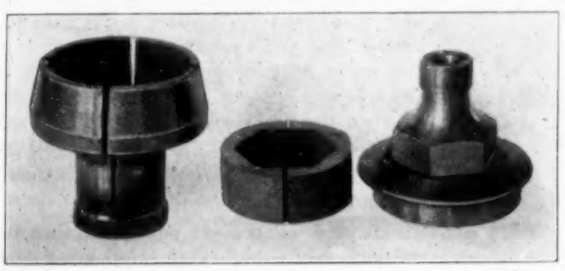


FIG. 3.—MASTER COLLET, FALSE JAWS AND A VALVE BONNET.

Organized iron molders of New York and vicinity have gained a peaceful concession, 2,200 of their number having been granted the 9-hour day.

Puddlers employed by the Harrisburg (Pa.) Rolling Mills and the Chesepeake Nail Works have had their wages increased to $4.50 per ton. Finishers have received an advance of about 5 percent.

RESOURCES OF THE CONNELLSVILLE REGION.*

BY H. N. EVANSON.

The Connellsville region proper, or the region which for years has produced the famous Connellsville coke, extends from Latrobe, on the main line of the Pennsylvania railroad in Westmoreland county, in a southwesterly direction across the lower end of that county and into Fayette county, crossing the Youghiogheny river at the town whose name has become famous wherever blast furnaces are operated, and across Fayette county to a few miles below Fairchance, a small borough about six miles south of Uniontown and about seven miles north of the West Virginia-Pennsylvania State line, with a length of about 40 miles and an average width, between outcrops of the vein, of slightly more than three miles.

Within a comparatively few years it has been found that a good quality of coke can be made from the Pittsburg seam of coal lying just west of the southern end of the Connellsville region, and to this district has been given the name of the Lower Connellsville region. This territory extends from the Youghiogheny River on the north to a point on the Monongahela river near New Geneva, on the south, and lies wholly in the western side of Fayette county. Its length is about 23 miles and its average width, between the eastern outcrop and the river, is almost exactly five miles. In this paper the whole district will be treated as one, forming as it were, a "Greater Connellsville Region."

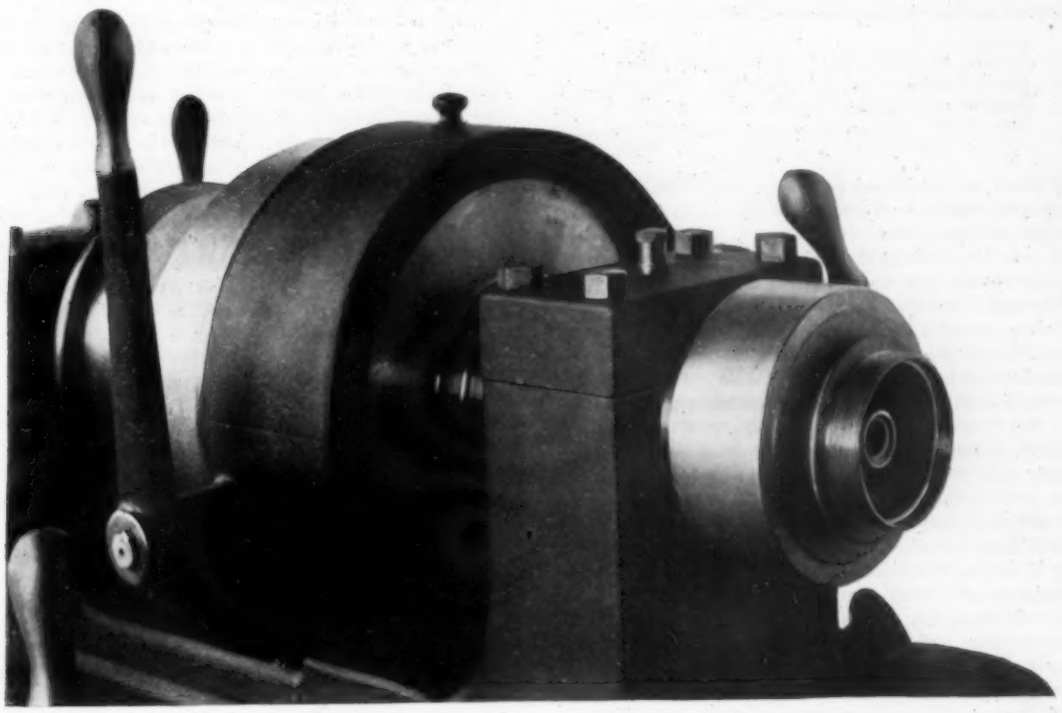


FIG. 4.—A VALVE BONNET HELD IN THE AUTOMATIC CHUCK.

Historically this region is the oldest in the western end of the State, and it was the scene of some of the earliest settlements west of the Allegheny mountains. George Washington passed through the district at least twice during the French and Indian War, and was so pleased with the character of the country that he patented a large tract of land near Perryopolis, upon a portion of which the large plant of the Washington Coal & Coke Co. is built. Fort Necessity, which Washington held for a time against the French, and finally surrendered, was situated about 10 miles southeast of the present site of Uniontown, and the grave of the illfated Braddock is situated on the National pike, almost eight miles from Uniontown.

The coal measures of the Connellsville region are in the shape of an elongated, flat basin, with its longer axis ending near Latrobe and Fairchance, and its sides forming the outcrops of the seam at opposite sides of the region. The coal dips from both ends and sides of the region toward the bottom of the basin; the dip across the region being very much steeper on the eastern side than on the western. Grades from 12 to 16 percent are common along the eastern outcrop, while there are few grades steeper than 6 to 8 percent upon the western side of the basin. The deepest portion of the region, geologically, is near Redstone creek, and apparently lies between one and four miles north of Uniontown and within one or two miles of the creek. Here an elevation of 520 feet above the mean tide at Sandy Hook has been reached in the Leisenring No. 2 mine of the H. C. Frick Coke Co., which is the lowest known point in the Connellsville region proper.

Developments in the Lower Connellsville region have not yet progressed sufficiently to define its exact shape, but in the Lambert mine of the American Coke Co., an elevation of 470 feet above mean tide has already been reached. This, perhaps, is the lowest point in the Pittsburg coal bed anywhere.

Within the limits of the region, as outlined above, the upper two seams of the lower productive measures and all of the coal seams of the upper productive measures outcrop. The Freeport seams are exposed at a number of points and they have been mined for local use. No commercial development has yet taken place upon these seams, but the Dunbar Furnace Co. is now conducting some experiments to test their quality and regularity. Of the coal beds lying above the Pittsburg, all have been exposed at many places and mined for local purposes. Of these, however, about the only one of any particular promise is the Sewickley seam, lying about 180 feet above the Pittsburg bed. This coal bed, at many places, attains a thickness of from 4½ to 6 feet, and is very clean. The coal is bright, and the quality is good, although the amount of sulphur carried by it is always higher than in the larger vein below. While what would be considered a good seam of coal elsewhere, this bed is completely overshadowed by the value of the famous Connellsville coal below it.

The Pittsburg seam in the Connellsville region is from 8 to 11 feet in thickness, of which thickness, however, but from 6 to 8 feet are mined, as the coal in the roof division of the seam is so intermingled with slate as to be commercially worthless. The binders in the seam are very thin, varying from the thickness of a knife blade to about 1 inch, and averaging about a half inch in thickness, and usually two or three in number, and they are always mined with the coal. The coal is very soft and easily

*Read at the meeting of the Central Mining Institute of Western Pennsylvania, at Uniontown, Pa., June, 1902. The writer is assistant engineer of the H. C. Frick Coke Co.

mined, nearly all of it being mined by hand, and it comes from the mine in small pieces, in the best possible shape for thorough coking. The roof, as a general thing, is but fair, and some coal is generally left in to support it. The bottom is generally regular, although in some mines numerous horsebacks are encountered, and in character it varies in different localities in the region, in some places being slate, in others limestone, and in still others fire clay. The coal is remarkably uniform and regular throughout the region. Its typical analysis is as follows:

Water	1.130
Volatile Matter	29.812
Fixed Carbon	60.420
Sulphur	7.89
Phosphorus	0.010
Ash	7.949

The coke made from this coal has a silvery lustre, a metallic ring, and a cellular structure; it is tenacious, comparatively free from impurities and is capable of sustaining a heavy burden in the blast furnace. It possesses the four essentials of a good blast furnace fuel in its hardness of body, its well developed cell structure, its purity and its uniformity of quality. The typical analysis of the coke is:

Water	0.070
Volatile Matter	0.880
Fixed Carbon	89.509
Sulphur	0.811
Phosphorus	0.014
Ash	9.830

The above analysis is not one of an isolated sample, but is an average of hundreds of analysis of coke taken from different mines all over the region.

Coke was first made in the region about 1817, for the rolling mill at Plumsock, but no effort was made to manufacture it for other use. The first shipment was made in 1841, and the experiment proved a flat failure. In 1843, however, a successful test of coke was made. The first works, now long since abandoned, was built in 1850 near Dawson. Practically, however, the industry first began in 1859, after a successful trial of the fuel in some Pittsburg furnaces.

At present, since the car supply has become sufficient for the demands upon it, the shipments from the region are averaging over a quarter of a million tons or about 13,000 car loads per week, and there is no doubt that the total production for the year will show a marked increase over that of 1901.

The Connellsville region was the first large coking region developed in the United States, and its growth has been much more rapid than that of any other. The region has always produced about three-fourths of all the coke produced in Pennsylvania, and has, until a year ago, always produced more than one-half of the total amount of coke manufactured in the United States. In 1900 its percentage of the total production was 49.5 percent.

In 1900, the coal produced in the Connellsville region and used in the manufacture of coke was 19 percent of the total amount of bituminous coal produced in the State of Pennsylvania, and 7.1 percent of the total amount produced in the United States.

At the present time there are in the region 23,707 coke ovens and there are 1,377 more under construction. All of these ovens are beehive ovens with the exception of 50 now in blast and 60 more under construction at Dunbar. These are Semet-Solvay ovens and are the only by-product ovens in the region. At this plant all of the by-products are saved, the ammonium sulphate and tar are shipped and the gas is used at the furnace and under the boilers.

The Connellsville region proper contained, when mining began, and area of 137 square miles, or 87,700 acres, of coal. Since the first coke plant was built, there have been mined out 29,700 acres, leaving at present, 58,000 acres of coal still available. The present rate of consumption of this coal is 1,500 acres per year, and the life of the region, at this rate, would be about 39 years. From past experience, however, this rate of consumption will increase instead of remaining stationary, and the estimate of 30 years recently made as the life of the region, will be as nearly correct as it is possible to make such a prediction.

The Lower Connellsville region contains an area of about 114 square miles, or 73,000 acres, of which amount at least 71,000 acres are yet unmined. The development of this region has but begun and it would be extremely hazardous to essay and estimate of its probable life.

There are now opened and in operation, in the entire region, 114 mines, the entire output of all but four of which is made into coke. Ninety-four of these mines are in the Connellsville region proper, and 20 are in the Lower Connellsville region.

The mines may be classified as follows, as regards the character of the operation:

Connellsville region, drifts, 38; slopes, 32; shafts, 24; total, 94. Lower Connellsville region, drifts, 10; slopes, 5; shafts, 5; total, 20. The total drifts are 48; slopes, 37; shafts, 29.

The deepest shaft in the region is the Lambert shaft of the American Coke Co., with a depth of 631 feet; the second deepest is the Leisenring No. 3 shaft of the H. C. Frick Coke Co., with a depth of 547 feet. The distinction of having the largest output of any mine in the region is probably enjoyed by the Standard shaft of the H. C. Frick Coke Co., with a daily output of about 2,200 tons, although the output of the shaft of the Washington Coal & Coke Co. usually nearly reaches this figure, and sometimes exceeds it.

The standard size oven throughout the region has been for years 12 feet in diameter by 7 feet high. Many of the newer plants, however, have increased the size of the oven, some of them being 12 feet 3 inches by 8 feet, and some 12 feet 6 inches by 8 feet 6 inches high, the slight increase in size meaning a considerable increase in capacity. Up to the last few years nearly all of the fire brick used in the region were made of clay, but at present fire clay bricks are used only for lining brick, while the crowns are made of silica brick, which are giving good satisfaction. The ovens are charged at a majority of the plants from steel side discharge larries, drawn by small steam locomotives. At some of the newer plants, however, the larries are run by electricity, the trolley system being used in every case.

COLORADO FUEL & IRON CO.

After the recent meeting of the directors of the Colorado Fuel & Iron Co., held at Denver, Col., an official statement was made public which is substantially as follows:

At a meeting of the board of directors of the Colorado Fuel & Iron Co., held at the general office of the company, Boston building, Denver, Col., the directors present were J. B. Grant, W. H. James, J. A. Kebler, Cass E. Herrington, Dennis Sullivan, John L. Jerome, A. C. Cass and J. C. Osgood. The chairman made the following statement in relation to earnings and dividend requirements:

"When the management, on May 31, 1901, recommended the payment of dividends on common stock it was with the belief that the current earnings, accumulated profits and early completion of the steel works and other improvements, fully warranted it, and that the payment of regular quarterly dividends could be maintained.

"A full year's dividends, amounting to $1,625,270.50, have been paid and the company still has a surplus of undivided net earnings of $947,585.39, but the current earnings are not sufficient to pay the current dividends. The earnings are showing a slight monthly increase, the net earnings for May having been $172,550.08. The full requirement to meet all charges, sinking funds and dividends, including dividends on the common stock at the rate of 7 percent per annum, amounts to $250,000 per month.

"The only improvement which has been completed is one blast furnace, but the profits derived from it have been in a great measure offset by the increased costs of all the steel works' products resulting from the disadvantage of operating the old plants while the new work is in progress.

"The great delays which have occurred in completing the improvements to the point of profitable operation have been wholly unexpected although a reasonable margin for delay was calculated on. All of the construction work undertaken by the company has been completed on time but the principal contracts for material, machinery and construction are from six to eighteen months behind the specified dates for completion.

"To add to the difficulties of the situation the employes of

the contractors on iron construction have been on strike for two weeks and are still out. The management is unable, in view of past disappointments, to fix any date when the improvements can be completed and in profitable operation."

A resolution was passed suspending temporarily the payment of dividends on the common stock. The semi-annual dividend of 4 percent on the preferred stock was ordered paid on Aug. 29.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The St. Louis Pneumatic Tube Works, of Jefferson City, Mo., have been incorporated with $50,000 capital for the purpose of operating a plant for the manufacture of pneumatic tubes. W. E. Clarke, R. W. Morrell, R. A. Jones, D. W. Voyles and M. W. Oliver are the incorporators.

W. A. Russell & Co. have been incorporated in New Jersey with $100,000 capital for the purpose of engaging in the manufacture of iron and steel products. C. V. Childs, G. T. Mills and H. N. Smith are the incorporators. The principal office is at East Orange, N. J.

At Frankfort, Ind., a company is being organized to have a capital of $25,000 to engage in the manufacture of brass goods including steam fittings, etc. Those interested are D. A. Coulter, G. T. Dinwiddie, J. H. Coulter, W. H. Coulter, J. McClamroch, F. S. Coulter, H. C. Sheridan, J. B. Meifeld, J. P. Given, H. F. Campbell and C. C. McFann.

Henry Wick, of Youngstown, O., has purchased coal lands in Chartiers and Mt. Pleasant townships, Pennsylvania, and will at once begin their development. A mining town will also be laid out.

It is reported that a steel plant will be erected at Chattanooga, Tenn., but particulars are not obtainable at this time.

The Enamel Steel Tile Co. have been organized at Wheeling, W. Va., for the purpose of manufacturing steel tiling. J. F. DuBois is president; E. J. Drennan, vice president; J. W. Garber, secretary and treasurer.

The Miskimen Furnace Co., of Logansport, Ind., has been organized with a capital of $50,000 to manufacture furnaces and heating appliances. George W. Miskimen has been elected president; H. J. Crismond, vice president; G. W. Walters, treasurer, and H. T. Tomlinson, secretary. A site for the foundry and plant has already been secured.

The Norris Laundry Machinery Co., Detroit, Mich., has filed articles of incorporation for the manufacture and sale of laundry machinery. The capital stock is $15,000, and the stockholders are: George E. Norris, Fred H. Norris, and Robert L. McMicking.

The American Valve & Meter Co., of Cincinnati, has been incorporated with $33,000 capital for the purpose of engaging in the manufacture of meters. N. P. Tenner, Jr., William Porter, F. M. Foster, D. S. Marfield and C. E. Prior, all of Cincinnati, are the incorporators.

The Western Steel & Wire Co., of Chicago, has been incorporated with $50,000 capital. A. H. Symons, J. P. Floan and L. J. Doyle are the incorporators.

The Raritan Structural Steel Co., with principal office at 227 Townsend St., New Brunswick, N. J., has been incorporated with a capital of $300,000 to manufacture structural steel.

The Electric Metal Separating Co., with principal office at 46 Haledon Ave., Paterson, N. J., has been incorporated with a capital of $150,000. The company will refine scrap metals.

The American Insulated Wire & Cable Co., with principal office at 15 Exchange Place, Jersey City, N. J., has been incorporated to manufacture insulated wire; capital, $150,000.

The Cleveland Galvanizing Works, 18-24 Cooper St., Cleveland, will buy a second-hand 150-pound drop hammer. State condition and price.

Souler & Steinberg, of Milwaukee, Wis., are considering the erection of a machine shop and foundry at Shawano, Wis.

McGregor & McIntyre, Ltd., have been incorporated at Toronto, Ont., with $100,000 capital to manufacture and sell structural and ornamental iron work. J. H. McGregor, R. L. McIntyre, J. McIntyre and E. McGregor are the incorporators.

The Timken Roller Bearing Axle Co. have been incorporated at Jersey City, to manufacture anti-friction bearings; incorporated by H. H. Timken and W. R. Timken, of Canton, O., L. M. Preston, of New York City, and Charles Hardenburg, of Jersey City.

The Carolina Agricultural Implement Mfg. Co., of Blacksburg, S. C., has been incorporated to manufacture agricultural machines, implements, capital stock to be $25,000. Incorporators are: John F. Jones, of Blacksburg, and W. B. Castles, of Hickory Grove, S. C.

Venable Bros., Atlanta, Ga., will buy 200-h. p. Corliss engine, two 100-h. p. boilers and water heater for same.

A. M. Gibbes, treasurer Columbia Machine & Iron Works, Columbia, S. C., will buy equipment for iron works, including electric power.

Fires and Accidents:—

Fire at the plant of the American Mfg. Co., Middleport, O., July 7, caused $6,000 damage. The company manufactured sanitary equipment.

The Haish Foundry, DeKalb, Ill., was destroyed by fire last week.

Nearly the entire plant of the Capewell Horse Nail Co., Hartford, Conn., was destroyed by fire July 3. The estimated value of the plant was between $300,000 and $400,000 and the insurance will nearly cover the loss.

New Construction:—

The Minneapolis (Minn.) Steel & Machinery Co. has obtained a permit for improvements to the harvester works and the machinery plant amounting to $90,500.

The American Railway Switch Co. has purchased a tract of land near Buffalo, N. Y., and on this 7-acre site will erect a plant which will employ 200 men.

The El Paso Foundry & Machine Co., El Paso, Tex., will erect a shop, 60x125 feet, at an estimated cost of $2,500. A quantity of new equipment is being purchased, including traveling cranes, shears, etc.

The Union Steam Pump Co., of Battle Creek, Mich., has recently purchased a piece of ground 78x200 feet, adjoining the present plant and will erect a brick building.

Work has begun on the erection of the plant of the Minneapolis Steel & Machinery Co., Minneapolis, Minn. The plant will consist of a machine shop, foundry, structural shop, warehouse and boiler room. The cost of the erection of the buildings is nearly $100,000. The plant is to be placed in operation about October. The company was recently organized with a capital of $500,000.

The Atlas Engine Works, Indianapolis, Ind., has purchased a large plot of ground upon which the additions to the present plant are to be erected. The additions which will consist of a foundry, erecting shop and machine shop were outlined in these columns some time ago.

The Delaware Marine Supply & Mfg. Co., Wilmington, Del., will erect a machine shop, foundry and boiler house. The company is in the market for machine tools and foundry equipment.

Cox & Sons' Co., Bridgeton, N. J., will erect a large addition to their plant to cost $20,000. The company manufactures boilers.

The Ohio Brass Co., Mansfield, O., which recently increased its capital stock to $1,000,000, has extensive additions under way and under contemplation. Contracts have already been awarded for a three-story warehouse 175 feet long and 50 feet wide. A large machine shop, two stories high, 350 feet long and 56 feet wide, is under contemplation, contracts for which are to be let in several months.

The National Boiler Tube Co., New Brunswick, N. J., will erect a plant 75x225 feet.

The Canton Foundry & Machine Co., Canton, O., will erect a new foundry in the vicinity of its present plant. Work on the addition is to be hurried so that operations can be commenced about September 1.

The immense works of the Jordan L. Mott Iron Co. are to be removed from Mott Haven, N. Y., to Trenton, N. J., as soon as a new million dollar plant can be completed. President

O. O. Bowman, of the Broad St. National Bank, who is identified with the Mott people in business, has made the official announcement that the change is to take place and that plans for the Trenton plant have already been completed. The company employs 2,500 men.

The Donovan Wire & Iron Works, Toledo, O., will erect a plant on a recently purchased site of 7 acres for the fitting of structural steel. The company is in the market for equipment, including cranes, punches, shears and riveters.

Work has begun on the foundation for the new brick building to be erected in Canton, O., by the Canton Foundry and Machine Co. A large frame structure to be used temporarily for foundry purposes will be built.

The Moran Bolt & Nut Co., of St. Louis, and Luther McGilery, of Madison, Ill., have purchased the site of the rolling mills of the Hager Steel & Iron Co., of Madison, which were destroyed by fire several months ago. The mills will be rebuilt.

A two-story brick addition 50x125 is to be erected by the St. Mary's Machine Works, St Mary's, O.

George W. Heartley, of Toledo, O., manufacturer of eave trough hangers, power and hand punching machinery, tools and dies, has purchased a building 33x99, four floors, and will erect another building 66x99.

The Zanesville Malleable Iron Works, Zanesville, O., have commenced work on their new building, 270x280 feet.

The H. K. Porter Co., Pittsburg, will build a one and two story boiler house, 100x200, cost $50,000.

The Aetna Locomotive & Machine Co., Seattle, Wash., will erect a $300,000 plant for the manufacture of locomotives, freight cars and machinery.

The Louisville & Nashville R. R. Co. will double the size and capacity of its shops at Decatur, Ala.

The Pittsburg District:—

At a meeting of the Vulcan Crucible Co., held in Pittsburg several days ago, W. S. Kidd retired as president and was succeeded by John Caldwell, treasurer of the Westinghouse Electric Co. Samuel G. Stafford was continued as secretary and J. B. Graham as treasurer. The company's plant at Aliquippa is to be considerably enlarged in the near future by the erection of ten puddling furnaces, a 10-ton open-hearth furnace, two annealing ovens and a train of 10x14-inch rolls will be installed.

At a meeting of the directors of the recently incorporated Empire Chain Co., a permanent organization was affected by the election of M. D. Kuhn as president, J. J. Sehn as secretary and treasurer, and David Snyder as superintendent. The company is capitalized at $5,000 and is operating a plant on Smallman St. between Twenty-ninth and Thirtieth Sts. The plant contains six forges.

The Ferguson Tin Plate Co., of Pittsburg, has made an appilcation for a Pennsylvania charter, the business of the Ferguson Tin Plate Co., Ltd., to be taken over. The company is operating a tin plate dippery in East Liberty with a capacity of 500 boxes of plate per week.

The American Bridge Co. has been awarded the contract for the erection of the steel work of the new power plant of the Pittsburg Railways Co., to be erected on Brunot's Island, below Pittsburg, in the Ohio River. The building will be 400 feet long and 200 feet wide and about 1,200 tons of steel will be required. Contracts for boilers, engines and dynamos will be awarded shortly.

A. T. B. Somerville, formerly employed in the engineering department of the American Bridge Co., has organized the Somerville Engineering Co., with offices in the Frick building. The company is engaged in general engineering work and makes a specialty of the erection of bridges and steel structures.

General Industrial Notes:—

The machinists in the employ of the Union Pacific Railway at Council Bluffs, Ia.; Cheyenne, Wyoming; North Platte, and Omaha, Neb., and Armstrong, Kas., went on a strike last week for an increase in wages of 10 percent and demand the abolition of the piece work system. About 1,700 men are affected.

The Penman Steel & Iron Works, Beaumont, Tex., has closed a contract for nine oil tanks with a capacity of 55,000 barrels each. The company now has orders on its books for a large number of oil tanks to be erected at various points throughout Texas, the last order alone requiring nearly 2,000 tons of steel plates.

The fiftieth annual meeting of the Antrim Iron Co., of Grand Rapids, Mich., whose plant is located at Mancelona, was held last week. A dividend of 15 percent for the year was declared on a capitalization of $350,000. T. J. O'Brien was elected president; J. M. Barnett, vice president, and J. C. Holt, secretary and treasurer. The above officers together with H. J. Hollister, Willard Barnhart, Edward Lowe and William Judson compose the board of directors.

The Roley Foundry, Marysville, O., owned by Adam Roley, has been sold to Edward Bowen, of Marion, O., and C. F. Maines, of Marysville.

At a meeting of the stockholders of the recently incorporated Youngstown Bronze Co., of Youngstown, O., G. S. Jones was elected president; J. W. Long, vice president and superintendent, and W. H. McMillan, secretary and treasurer.

The Maumee plant of the Republic Iron & Steel Co., located at Toledo, O., has been shut down for extensive repairs. It is expected that operations will be resumed about the middle of August.

Directors and officials of the Illinois Steel Co., Chicago, Ill., have established a bank at South Chicago to be known as the South Chicago Savings Bank. The incorporators are E. J. Buffington, T. W. Robinson, T. J. Heyman, C. H. McCullough, Jr., William A. Field, D. S. Mathias, L. D. Doty and George Carlisle. The capital will be $200,000.

The controlling interest in the Findlay Axe & Tool Co., Findlay, O., owned by the heirs of the late R. M. Abbott has been purchased by J. S., C. W., and F. T. Patterson. A reorganization of the company will follow.

The old co-partnership of S. Severance has been incorporated under the laws of Pennsylvania and is now the S. Severance Mfg. Co., with a capital of $500,000.

The United States Brass Mfg. Co., of Warren, O., has closed, pending a settlement with creditors. The company proposes a plan whereby it can pay 35 cents on the dollar on all claims. The liabilities exceed $30,000. The enterprise was started by Warren and Cleveland men and, if a settlement can be reached, it will resume operations under reorganization.

Niagara Furnace A of the Tonawanda Iron & Steel Co., at North Tonawanda, N. Y., was blown in again on July 8, after being relined. The furnace was blown out in May, part of the old lining being eight years old and the remainder five years old.

The Gillie Engine & Machine Co., of Tonawanda, N. Y., makes a specialty of marine repair work, having a complete foundry, machine shop and boiler shop, as well as carpenter, paint and pattern shops. The company also contracts to build special machinery. One of its own specialties is a steam riding gallery. In this line it has built up an export trade of some proportions.

The Best Scott Foundry & Machine Co., of Warren, Pa., recently changed its name to Allegheny Foundry Co., Ltd.

A consignment of English steel arrived in Milwaukee last week, the first received in ten years. It consisted of three carloads of rails and fish plates for the Milwaukee Harvester Co. More is on the way.

The Page wire fence plant at Adrian, Mich., is closed for a few days taking inventory. It has been running 22 hours a day. The company employs 600 men in this factory and 70 persons in the office. There are 700 employed at the mill in Monessen, Pa. An output of 125 tons of woven wire is made daily at Adrian.

Judgment of foreclosure and sale in the suit of Allen C. Washington as trustee vs. The Iron Steamboat Co., Brooklyn, N. Y., has been granted by the supreme court in Brooklyn. The amount of the mortgage is $1,000,000. Reorganization of the company is in progress, the committee being Samuel L. Wolverton, Allen C. Washington, and Cashier Backus, of the National City Bank of Manhattan.

The American Turret Lathe Mfg. Co. has been delayed in the erection of its Warren, Pa., plant by failure to receive steel. The company is now making three sizes of one type of its turret lathe, but will enlarge its line when adequate capacity is available.

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is due to the *peculiarly right* construction of the baffle.

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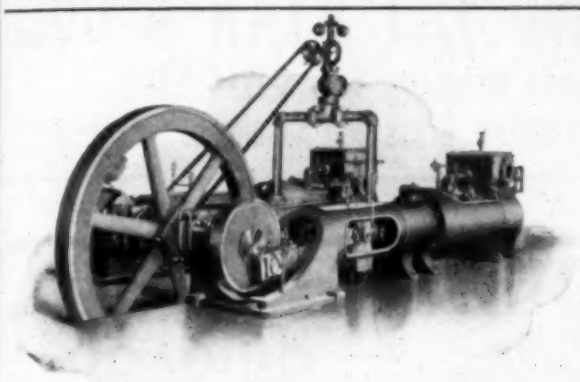

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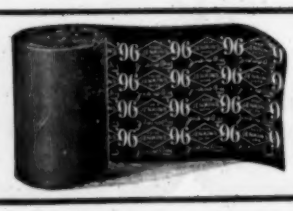

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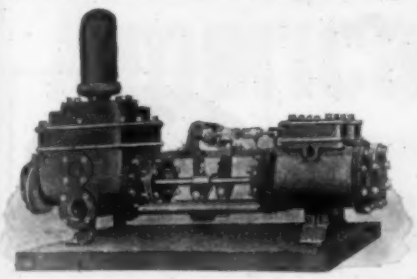

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Kept from settling by our
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Improved Washers with steel or wood logs. Screens, cylindrical and conical of all descriptions. Steel, slow moving elevators and conveyors. Picking Belts for coarse material and hard usage. Friction Hoists. Single Roll Crushers for rough crushing in large quantities.

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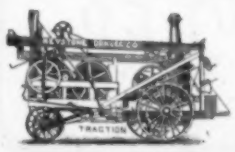

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SET, CAP and MACHINE
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Then you want the

Green Traveling Link Chain Grate.

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Get our complete catalogue. CHICAGO, ILL.

DIXON'S SOLID Belt Dressing

For the busy man, the Solid Belt Dressing is a great convenience. We do not recommend it quite so highly as our Paste Dressing, but it is possibly superior to anything of the kind in the market.

SAMPLE SIZE FREE.

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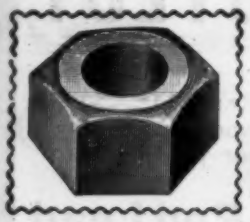

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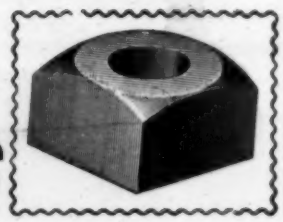

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MANUFACTURERS OF

MERCHANT BAR IRON AND STEEL

(Annual Capacity about 150,000 Tons)

Also Every Variety of

Machine Bolts, Nuts, Washers, Turnbuckles, Lag Screws

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CAR FORGINGS and RODS AND IRONS FOR BRIDGES, BUILDINGS, ETC., ETC.

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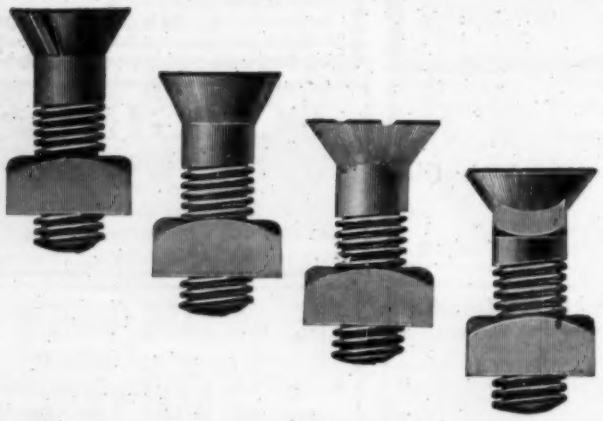

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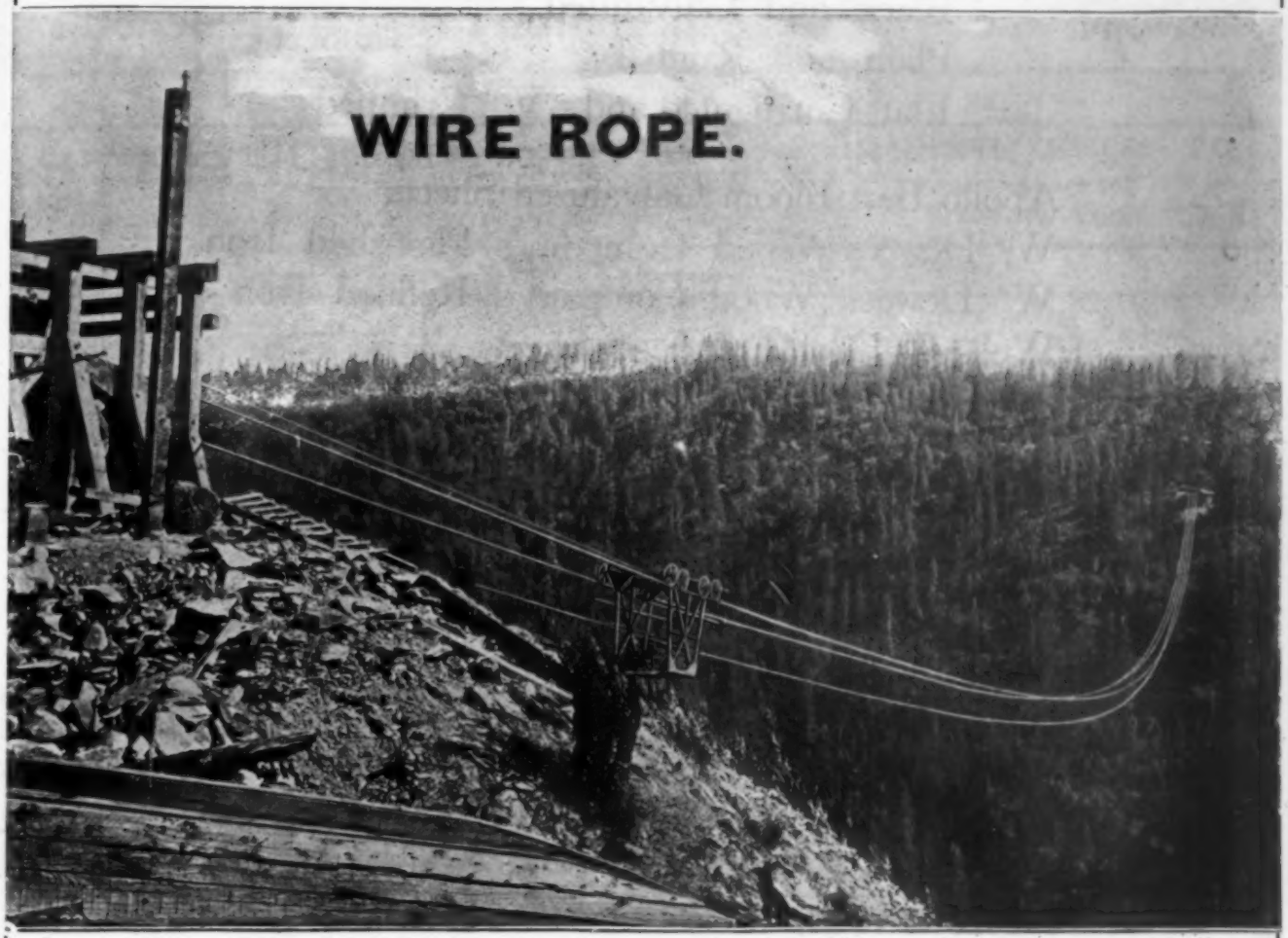

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Black and Galvanized
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T. W. Simpers, Land Title Building, Philadelphia
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Manufacturers of BLACK and GALVANIZED SHEETS, PLAIN and PAINTED, FLAT and CORRUGATED.

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DOES IT PAY to use coated sheets in place of black?

IT DOES if you use the ALUMINUM COATED.

Some of our customers are using it as a substitute for copper.
It can be soldered with common solder.

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STEEL CASTINGS That will Forge, Weld and Temper. Will not Crystallize.

Graphite through the metal breaks up vibration.

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Specialty: Sable Brand Best Forging Iron.

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This (MF) trade mark is stamped on every sheet of the best roofing tin made. This (MF) mark means "Most Favored," because this brand is most favored by architects, dealers, and builders everywhere. MF Roofing Tin was first made in Wales 50 years ago—later the process was improved in America—and the product developed, until now MF Roofing Tin is more in demand than any other brand. The superior quality of MF Roofing Tin is attested by the first prize awarded it at the Paris Exposition, 1900, where it was in competition with all the world.

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If you want the latest and best machinery for this class of work, we build it. We brought out this line of machinery, have kept fully posted regarding any improvement which would make it better, and our present line of Winders, Cutters and Hammers represents the best practice of today.

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If you want something made let us hear from you. We can do the work and do it right. Will be pleased to answer your inquiries.

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Annealed and Galvanized Fence Wire.
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Rails, Blooms, Billets and Slabs.

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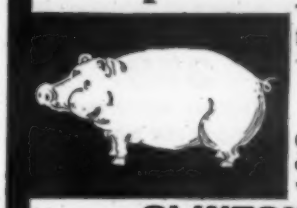

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Steel Billets and Slabs, both Bessemer and Open Hearth, Pig Iron, Manufactured Steel, &c.

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Manufacturers of the Celebrated Brands of Foundry Iron:

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This iron is specially adapted to thin, strong castings.

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Open Hearth Steel Castings, Forge Steel, High Pressure and

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Hydraulic Fittings, Oil Well Specialties, Castings Made True to Pattern and Uniform.

The American Iron and Steel Association has just completed a thorough revision of its well known

Directory.

The work of revision has been complicated by the succession of changes in the iron industry, that have followed so rapidly in the past three years.

The New Directory contains about 50 pages more than its predecessor of 1898, and is a cloth-bound volume of nearly 450 well printed pages.

It gives in the first 150 pages a full list of the **consolidations and reorganizations** that have taken place in the American Iron Trade in the past three years, with a full description of all the properties taken over, with their products, names of previous owners, etc.

Then follow 164 pages giving a complete description of all the iron and steel works not in consolidations. These are arranged by states.

Part 3 gives a classification by states of the iron and steel works of the United States, except blast furnaces, according to their products—Bessemer, Open-Hearth, and Crucible Steel Works, Steel Casting Works, Rail Mills, Structural Mills, Plate, Sheet and Skelp Mills, Tin Plate Works, Cut Nail and Wire Nail Works, Wire Rod Mills.

This Directory will be found invaluable to all concerns having business with iron and steel manufacturers in any line. The price is $10, postpaid.

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Puts into solid block form fine ores and flue dust.

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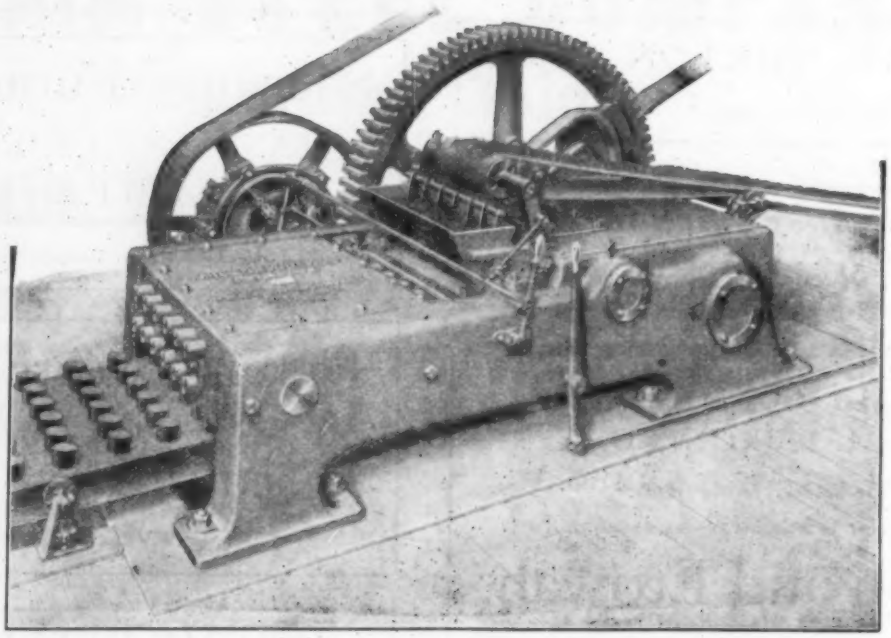

No. 1 White Briquetting Press—Built in 3 sizes. Capacity of No. 1 Press is 100 tons in 10 hours.

Secures the same results as are obtainable when lump ore is used in large quantities.

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